Indonesian Manufacturing and the Economic Crisis of 1997/98

Dionisius Ardiyanto Narjoko

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Declaration

Unless otherwise indicated this

thesis is my own work

Dionisius Ardiyanto Narjoko

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Abstract

This study examines the responses of firms in the Indonesian manufacturing industry to the deep economic crisis in 1997/98. It utilises a rich annual data set on medium and large plants in the manufacturing industry from 1993 to 2000, which covers the high-growth pre-crisis period, the peak of the crisis and the early recovery period. Three aspects of the responses are the focus of this study: general performance and survival, export-supply response and firm-entry response.

The study begins with an overview of the development of Indonesian manufacturing in the three decades leading up to the 1997/98 economic crisis and the crisis period. This is followed by a summary of the crisis and a review of the relevant literature to provide a framework for the empirical analysis in subsequent chapters. The descriptive analysis of the impact of the crisis reveals that there is a substantial variation in the plant-level impact of the crisis. The evidence also shows that, while many firms contracted and recorded very weak performance, some actually expanded and improved during the crisis. This variation can be seen even at a very disaggregated level of industry and in the early recovery period. The analysis also shows that the crisis severely affected the demographics of plants. Exit rates, for example, increased to almost double the pre-crisis level during the peak of the crisis.

The analysis shows that the firm responses and survival during the crisis were not simply random in nature. It finds that foreign ownership, sales orientation, size, factor intensity and product market competition are the major determining characteristics of the responses and survival. In the econometric analysis, the coefficients of the variables representing foreign ownership and sales orientation consistently show a positive relationship with respect to the various performance variables used in this study. The positive effect of foreign ownership was more significant in the early stage of recovery, suggesting that the role of parent companies was more important during this period. In contrast, the positive effect of sales orientation appears to have been weaker in the early stage of recovery. The analysis also

found some interrelationship between some of the characteristics explaining the responses and survival. Several interesting findings emerged. In particular, the effect of sales orientation was higher at plants with a high foreign ownership share and did not necessarily weaken with the extent of plant financial leverage.

The study extends to the investigation of factors determining the success in their export response. It is motivated by the findings of other studies which highlight the weak export performance of the crisis-affected countries, despite the increase in competitiveness from the sharp exchange rate depreciation during the crisis. The results, confirming the earlier findings, point to the characteristics of firms and industry as the determinants of the firm success in their export response. More importantly, the results reveal the significant role of sunk-costs into exporting activities in determining the export response. The descriptive analysis shows a strong trend for plants that were non-exporters before the crisis to remain so during and after the crisis. The econometric analysis reveals that the variables which are related to sunk-costs - such as exporting history, an industry's export intensity, and an industry's prior export competitiveness - are positively related to the probability to export during and after the crisis. In addition to the sunk-costs, the ability to compete in international markets and foreign ownership are the other important determinants. In particular, non-exporters before the crisis found it easier to become exporters in the crisis period if they are more efficient, able to produce goods to international standards and have some foreign ownership share. Finally, the analysis reveals that access to credit is important for successful switching by non-exporters.

As for entry response, this study analyses the difference in the determinants of firm entry between the pre-crisis and crisis period. The analysis is motivated by the earlier finding which shows that the rates of firm entry in the industry had not begun to recover by 2000. The analysis provides several interesting findings. The extent of cost-disadvantages faced by entrants appears to have increased during and shortly after the crisis. The competitive pressure among firms also appears to have been much stronger in this period. This particular conclusion is supported by several findings: demand and profit opportunities seem to have become more important, the likelihood for collusive behaviour appears to have fallen significantly and the crisis seems to have pushed some less-efficient firms out of the industry. The crisis, finally, seems to have provided opportunities for some potential entrants, despite the unfavourable economic situation. For example, the results suggest that entry rates rose in export-oriented industries during and after the crisis.

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Glossary

2SLS	: Two stage least square
ADB	: Asian Development Bank
ANU	: Australian National University
Apindo	: *Asosiasi Pengusaha Indonesia,* Employers' Association of Indonesia
ASEAN	: Association of Southeast Asian Nations
ATB	: Anti Trade Bias
Bappenas	: *Badan Perencanaan Pembangunan Nasional,* the National Planning Agency
BI	: Bank Indonesia
BKPM	: *Badan Koordinasi Penanaman Modal, the* Investment Coordinating Board
BPPC	: *Badan Penyangga dan Pemasaran Cengkeh,* Clove Marketing Agency
BPS	: *Badan Pusat Statistik,* Indonesian Central Board of Statistics
CBS	: Currency Board System
CBU	: Completely built-up
CGI	: Consultative Group on Indonesia
CKD	: Completely knock-down
CPI	: Consumer Price Index
CSIS	: Centre for Strategic and International Studies
DID	: Difference in Difference
ERP	: Effective Rate of Protection
FDI	: Foreign Direct Investment
GDP	: Gross Domestic Product
Guided Economy Era	: refers to the period President Soekarno's regime, generally taken as 1949 to 1996.
HCI	: Human Capital Intensive

ICSEAD : International Centre for the Study of East Asian Development

IEDB : International Economic Data Bank

IMF : International Monetary Fund

INDRA : Indonesian Debt Restructuring Agency

I-O : Input-Output

ISIC : International Standard of Industrial Classification

JSX : Jakarta Stock Exchange

LDC : Less Developed Countries

LM : Breusch-Pagan Lagrange Multiplier

LPM : Linear probability model

M0 : Base money (currency in circulation)

MLE : Maximum Likelihood Estimation

Mobnas : *Mobil Nasional,* National Car Programme

Malari : *Malapetaka Lima Belas Januari,* refers to riots on 15 January 1974

MOCSME : Ministry of Cooperative and SMEs (Small- and Medium-scale Enterprise)

NBER : National Bureau of Economic Research

New Order : refers to the period since the commencement of President Soeharto's rule, generally taken from March 1966

NRI : Natural Resource Intensive

NTB : Non Tariff Barrier

PLN : *Perusahaan Listrik Negara*, Stated-owned Electricity Company

PT : *Perusahaan Terbatas,* Limited liability

RCA : Revealed Comparative Advantage

REER : Real Effective Exchange Rate

RERP : Real Effective Rate of Protection

RESET : Ramsey's Specification Test

Rp : *Rupiah*

SBI : *Sertifikat Bank Indonesia,* Bank Indonesia Certificate

SI : *Statistic Industry*, refers to the annual manufacturing surveys of medium- and large-scale establishments conducted by BPS

SITC : Standard International Trade Classification

SOE : State-owned Enterprise

SURE : Seemingly Unrelated Regression

TI	: Technology Intensive
TNI	: *Tata Niaga Impor,* approved importers' system
TPR	: Trade Policy Review
ULI	: Unskilled Labor Intensive
UN Comtrade	: United Nation Commodity Trade Statistics Database
WPI	: Wholesale Price Index
WTO	: World Trade Organisation

Note: unless otherwise specified, all $ refer to $US

Chapter 1

Introduction

1.1 Background and objective of the thesis

The 1997/98 economic crisis was one of the most important events in the history of Indonesian economic development. After growing rapidly in the 30 years leading up to 1996, the economy contracted severely by about 14 per cent in 1998. At one stage, the Rupiah was valued at only about 20 per cent of its value preceding the crisis. The crisis also resulted in the end of the New Order regime, which had dominated the political arena. During and shortly after the crisis there was a period of accelerated trade liberalisation, owing to the structural adjustment program attached to the rescue packages of international institutions.

While the decline in manufacturing industry was broadly similar to the economy-wide picture, there was considerable variation in performance across industries and individual firms. While some firms went bankrupt and others contracted sharply, some were able to endure the crisis relatively successfully and a few even prospered.

This thesis focuses on the response of firms in manufacturing industry. It utilises a rich annual data set on medium and large plants from 1993-2000, which covers the high growth period, the peak of the crisis and the early recovery period. This thesis will examine the response in order to gain some insight into the determining factors.

The motivation for this study is twofold. First, little is known about the responses of firms to the crisis, despite some studies that examined the impact on industry, such as Dwor-Frecaut et al. (2000) and the papers published in a special issue of the journal *The Developing Economies* in December 2000 (Volume 37, No. 4). Most of these studies focused solely on the impact at the aggregate industry level. As has been indicated in a few studies, and also in this thesis, there was a large variation in responses across firms. Of the studies highlighting this variation, such as Dwor-Frecaut et al. (2000), Thee (2000) and Sato (2000), all have some methodological limitations. For example, the analysis by Dwor-Frecaut et al., which is based on a firm level survey of some manufacturing firms in the crisis affected countries done by The World Bank, was criticised as being subject to survival bias. This is because the findings were based only on firms that survived the crisis. The survival bias is also a concern even in studies where a case study approach has been adopted (e.g. Sato 2000). All in all, these studies are limited in methodology because of the ability of researchers to only observe surviving firms.

Second, the crisis in Indonesia has provided a valuable 'natural experiment' for a broader topic of how firms in general respond to a severe downturn. Empirical studies on this subject are scarce, even for developed countries.[1] There are some topics of research that can be derived from this subject, a few of which are addressed in this thesis. The crisis event is even more valuable because each of these topics is not only relevant in the context of this thesis, but also in the context of the more general literature. For example, the export supply response to the crisis is related to a more general topic which questions why a favourable trade and exchange rate regime often induces only a minimal export response.

A particular focus of the thesis is the role of firm characteristics in shaping firm performance response, export supply response and change in the determinants of entry between the pre-crisis and crisis periods. These issues are the core of the thesis and all presented in Chapters 6 to 10.

1.2 Thesis organisation

Chapter 2 provides an overview describing the evolution of trade and industrial policies in Indonesia and the key features of the country's industrialisation.

Chapter 3 describes the 1997/98 economic crisis in Indonesia. It consists of two main parts, the course of the crisis and the economy-wide impact.

Chapter 4 reviews some relevant literature to provide an analytical framework for the

[1] Despite this, there are a limited number of studies which to some extent address this issue in the context of Latin America crises (e.g. Krueger and Tornell 1999; Aguiar 2005; Watkins et al. 2004; Pratap and Urrutia 2004).

empirical analysis in the thesis. The discussion emphasises the role of aggregate shocks and the characteristics shaping firm performance during the crisis. The key theme is that firm characteristics played an important role in determining the success of firms in responding to the crisis.

Chapter 5 describes the data base and details the data adjustment and cleaning process.

Chapter 6 derives some basic facts about the impact of the crisis on industry. The findings provide a backdrop for the empirical analysis. It re-examines the impact at the industry level and attempts to determine whether there was a large variation in the performance impact across plants. Five performance measures are used to proxy performance, namely: real value added, real output, employment, real value added per labour and price-cost margin.

The chapter also aims to fill the gap in the literature by examining the impact of the crisis in relation to how entry and exit of plants was affected. As mentioned, all previous studies have focused only on the subset of surviving firms.

Chapters 7 and 8 identify which plant characteristics matter in determining the response. An interesting fact derived from the previous Chapter 6 is that there was a large variation in the performance impact across plants. Some were more severely affected than others and some actually expanded. The fact that the variation persists at a disaggregated industry sub-sector indicates some plant specific factors might have been important in shaping the performance response.

Several characteristics considered important in the theory and which can be measured from the data base are tested. The role of exogenous shocks from the crisis literature, the shock to the financial sector and the sharp exchange rate depreciation, suggest financial leverage, sales orientation, and factor intensity are the major important characteristics. From the general literature on firm performance, size, age, and ownership can also be important. The fact that there was a more liberal trade regime during the crisis – due to the accelerated trade liberalisation during the period – suggests the extent of competition from imports could also have been the determining characteristics.

Two methodological approaches are adopted: descriptive and econometric analysis. The descriptive analysis, undertaken in Chapter 7, seeks to determine whether there are systematic patterns of performance impact across the groups of considered characteristics. The analysis uses the five performance measures defined earlier. The descriptive analysis is extended to an integrated econometric analysis in Chapter 8 for three reasons. First, to ascertain whether the results from the descriptive analysis are robust. Second, to control the results from a possible survival bias, and third, to explore some interrelationships between the characteristics in a simpler and more efficient way.

The econometric analysis adopts the Heckman selection model to eliminate survival bias. The main equation, i.e. the equation to explain the difference in performance between the crisis and pre-crisis, is estimated jointly with an estimation of survival equation.

Chapter 9 examines the export supply response of plants to the crisis. Sharp exchange rate depreciation is one of the characteristic features of the crisis. It is a common view that sharp exchange rate depreciation should convert to improved export performance for countries affected by the crisis. Several studies (e.g. Duttagupta and Spilimbergo 2004) have contradicted this prediction. Although some explanations have been offered in the literature, those which focus on firm or plant behaviour are scarce. This chapter aims to fill this gap. In particular, it derives the picture of plants' export supply response and attempts to gain insight into the factors determining the success of plants in responding to the crisis in terms of exports.

Two dependent variables are considered to represent the export supply response: change in export participation and change in export intensity. The changes are defined as the differences between crisis and pre-crisis periods. Some characteristics of firms are tested against these changes. This approach is motivated by the literature on micro exporting behaviour, which suggests that characteristics, such as exporting history, size and foreign ownership, play an important role in determining a firm's export supply response.

The equation of the change in export participation is estimated within the framework of a binary choice model. An instrumental variable approach is adopted to guard against the potential endogeneity problem from the exporting history variable. Meanwhile, the equation of the change in export intensity is estimated using the Heckman selection model, in order to eliminate survival bias. In the sample, about 50 per cent of exporting plants before the crisis were no longer recorded as exporting during the crisis period.

This chapter also examines the data to shed some light on the view that the observed sluggish export performance in the crisis affected countries was caused by the contraction in credit to the private sector. The estimating equations are re-estimated by adding two variables that proxy the plant liquidity situation, that is, financial leverage and the percentage change in investment financed by bank loans.

Chapter 10 addresses the response of new firms entering the industry. It is motivated by the examination of the crisis impact on the population of plants, which reveals that the pattern of plants' entry does not seem to have recovered in 1999 and 2000, compared to the other performance measures. This raises the question of why such a pattern is observed? Accordingly, the chapter analysis whether there are differences in the factors determining plant entry between the pre-crisis and crisis periods.

Based on the views of entry during business cycles, this chapter hypothesises the factors determining entry in the industry would not have been the same between the pre-crisis and crisis periods. More detailed hypotheses are developed in respect of the key determinants of firm entry. A few of the most important are: (1) displacement entry should have been more important than replacement entry, (2) profitability, market growth and industry's export orientation should have been more important in attracting entry and (3) the negative effect of capital requirement as an entry barrier is expected to have been stronger in the crisis period.

An entry equation is estimated along with an exit equation. The exit equation is specified to take into account the possible interdependence between the entry and exit process. The equations are estimated for the pre-crisis and the crisis periods to test the developed hypotheses. In addition, the equations are also estimated within the crisis period to understand whether the determinants differed between the peak of the crisis and early recovery period. The earlier data examination reveals that the entry pattern differed significantly between these two periods.

Several estimation methods are experimented with (i.e. OLS, 2SLS and SURE methods). The analysis is based on the SURE method, since the Breusch-Pagan Lagrange Multiplier statistics suggests the entry and exit equations are correlated.

Chapter 11 draws the whole study together, provides the major findings, and attempts to derive policy implications of the findings. It also provides some suggestions for the future research.

Chapter 2

Overview of Industrialisation in Indonesia

2.1 Introduction

This chapter presents an overview of industrialisation in Indonesia over the 30 years leading up to the 1997/98 economic crisis. It begins with a summary of policy directions since the mid 1960s, and is followed by a brief discussion on the salient features of Indonesian industrialisation.

2.2 Policy direction between 1967 and 1995: a summary

At the risk of oversimplifying, it is possible to identify three policy objectives which affected the process of industrialisation in Indonesia over the period 1967-96.

The first policy objective was the shift from a heavily state-interventionist economy during President Soekarno's *Guided Economy* era, towards a more market-oriented economy. The policy, which was initiated by the New Order government under President Soeharto, aimed at restoring the Indonesian economy after a total breakdown in the mid 1960s. As is widely known, the economy at that time was operating at a very low level of production and trade, had negligible foreign reserves and was suffering from hyperinflation.

In 1967, the government introduced a new investment law. This opened up the economy to foreign investment, providing a wide range of incentives, such as a two-year tax holiday, and exemption of capital goods from import duties and sales tax. The same incentives were also given to domestic investors one year later. In addition to these laws, the government introduced other substantive policy reforms in 1970, including the unification of the multiple exchange rate system and simplification of export and import procedures.

Despite opening up the economy, to some extent the laws still restricted foreign investment. They required foreign firms to allow for domestic participation within a limited period of time.[1] The laws also restricted foreign investment in sectors which were considered strategic and related to the supply of public goods. According to Pangestu (1996, p.154), the tendency to limit foreign investment reflected a perennial dilemma faced by the government. On the one hand, the government needed foreign linkages to obtain capital, technology and market access, on the other, it was faced by the perceived threat of foreign domination.

The second major policy objective was a shift back to greater government intervention and a move towards more protectionist trade policy. Like other developing countries, the Indonesian government initiated an import substitution policy in the early 1970s. Ariff and Hill (1985) and Hill (1996) identified three factors behind adoption of the policy. First, there was political tension, resulting from growing resentment among nationalist groups to strong involvement of foreign interests created by the market-oriented policy.[2] Second, there were high oil and commodity prices during the decade. Large increase in oil revenues provided funds for the government to finance heavy industry investment and expand the state enterprise sector into such diverse areas as steel, fertiliser and cement. The third factor was an accumulated backlog in consumer demand as a result of a growing economy fuelled by the high commodity and oil prices.

The import substitution strategy lasted for about 14 years from 1972 to 1985. Within this period, the government implemented tariff and non-tariff barriers (NTB) to support the strategy. According to Thee (1994), tariffs were implemented to support the earlier stage of import substitution which focused on the downstream industries (i.e. final consumer goods) and NTB were used to support the second stage of import substitution which focused on upstream industries (i.e. intermediate and capital goods). As in other developing countries, this policy had a 'cascading effect' which sets higher tariff rates for consumer goods compared to intermediate and capital goods (Ariff and Hill 1985).

[1] By law, a foreign firm was initially given a licence to operate for a period of 30 years. However, it was required to transfer the foreign shares to domestic investors. If it failed to do so, the firm would be subject to mandatory liquidation.
[2] The resentment culminated in a large-scale protest in 1974 against the visit of Japan's Prime Minister Tanaka, popularly known as the 'Malari' protest.

The government implemented a wide range of measures. The most significant were the restrictions on foreign investment and imports. In 1973 the government established the Investment Coordinating Board (*Badan Koordinasi Penanaman Modal, BKPM*). The board was given discretionary authority to approve both foreign and domestic investment. BKPM published an annual Priority Investment List that detailed the economic sectors in which investment was allowed, for both domestic and foreign investors. The number of industries which were closed to foreign investors continuously increased during this import-substitution period.

An approved importers' system (*Tata Niaga Impor, TNI*) that restricted imports was introduced in 1982. Before this system, importers who obtained a licence from the government were either general importers (who could import most goods) or importer-producers (who imported raw materials and intermediate goods necessary for production). Under TNI, two types of licence were issued. The first was a general licence, under which an importer was approved to import goods falling under certain categories. The second was a specific licence, under which an approved importer was eligible for a licence to import particular goods, the amount and type of which were specified by the government. The specific licence system was aimed at controlling the amount and type of goods entering the economy. During the period 1982-86, many licences of the second type were issued (Pangestu 1996) and, as the licences were extended to more industries, it became obvious that politically connected business interests were the prime beneficiaries (Hill 1996).

Despite the inward orientation of the industrial strategy, some reforms were introduced in the early 1980s in response to falling oil and commodity prices. Exchange rate devaluation and banking sector deregulation were undertaken. The latter included removal of the interest rate ceiling, the credit ceiling and a reduction in liquidity credits. Apart from the macroeconomic and financial sector reform, the government also introduced tax and trade reforms during this period.

Two other major trade reforms were undertaken in 1985. The first was the rationalisation of tariffs, in the form of an across-the-board reduction in the range and level of nominal tariffs. The range of tariffs was reduced from an initial 0-225 per cent to 0-60 per cent, with most tariffs ranging from 5-35 per cent. The second reform was the improvement of customs and port procedures. All operations relating to import and export goods by the customs department were handed over to private companies. The handover significantly streamlined and simplified the customs procedures and reduced export bias.

The continuing threat of falling oil prices between 1982 and 1986 forced the government to initiate a third policy objective, which was export promotion. The government reacted quickly by devaluating the Rupiah by a massive 45 per cent in 1983, while at the same time controlling inflation using monetary and fiscal policies. In addition, a series of deregulation packages aiming to liberalise trade and investment regimes, and the financial sector, were introduced.

For trade liberalisation, bold measures were taken to reduce the export bias. Included in these were measures to reduce the costs of exports and to increase the flow of investment. In May 1986, a new and improved duty drawback scheme was introduced. Unlike the old system, this scheme allowed exporters to source imported input at international price and exempted them from all duties and regulation on imported inputs. Moreover, the scheme also allowed exporters to import directly without having to deal with import licensing.

The measures to reduce protection included the reduction of the general level of tariffs and the removal of many NTBs. These were undertaken in a series of deregulation packages from 1987 to 1997 before the 1997/98 crisis. The NTB removal was done by transforming them to equivalent tariffs and export taxes. One example was the removal of the import monopoly on plastics. Before the reform, import for raw material plastics had been awarded to a single government trading company, which then appointed a sole agent from a well-connected group. All of the imports had to be undertaken by the agent, who charged a fee and took a longer time to deliver the goods than would have happened if there were imported directly.

Concerning the liberalisation in the investment regime, equity restriction and divestment rules were gradually removed in a series of deregulations between 1986 and 1995. Significant reforms were undertaken between 1992 and 1994 to respond to the perceived decline in the investment climate in Indonesia (Pangestu 1996). Three policy measures were important during this period. First, the obligation for foreign firms to establish joint ventures with Indonesian partners and to divest the majority of capital over a certain period of time was removed. Second, minimum capital on foreign investment was reduced from about $1 million to $250,000 in 1992 and finally removed in 1994. Third, the government finally opened up nine sectors which before were closed for foreign investment.

The government introduced major financial sector reform in 1988, which principally removed entry restrictions for new banks. Foreign banks could enter Indonesia as a joint venture, with equity up to 85 per cent and without any product or geographical restrictions. As a result of this reform, the banking sector boomed and funds available to firms were greatly increased. Goeltom (1995) shows that the financial sector reform, including the changes in 1983, greatly improved access to credit for small and medium size, and export oriented firms.

Although economic reforms supporting export orientation were the dominant feature of policy changes between 1985 and 1995, there were remaining regulations that preserved the protectionist industrial policy. Some sectors remained closed to foreign investors and untouched by the reforms. In terms of NTBs, some industries continued to be assisted by restrictive licensing, administratively determined local-content requirements, restrictive marketing arrangements and export taxes (WTO 1998). Further, in more recent years there was a reappearance of interventionist industrial policy. Major examples were the granting of clove-industry monopoly rights to a private-state trading enterprise, and tax exemptions granted to a company to support the National Car Programme (*Mobil Nasional, Mobnas*). Each of these companies were partly owned by Soeharto's children.

2.2.1 Impact of the policy reforms on the extent of trade protection

What happened to trade protection after the policy reforms in the 1980s? Several studies have examined this issue. Among others, Fane and Condon (1996) provide estimates of the real effective rate of protection (RERP) between 1987 and 1995. Whereas the effective rate of protection (ERP) of a sector is defined as the proportionate increase in its value added per unit due to entire system of trade policy, the RERP is defined as the corresponding increase in its real value added per unit, where real value added is obtained by deflating nominal value added by the nominal wage (Fane and Condon 1996, p.35). The advantage of RERP is that it shows the effect of protection on the general price level and hence on the exchange rate, whereas ERP does not.

Table 2.1 demonstrates that trade protection was reduced across all broad sectors since the mid 1980s. RERP in non-oil and gas manufacturing fell significantly from 59 per cent in 1987 to 16 per cent in 1995. Similarly, the standard deviation of RERP dropped from 102 percent in 1987 to 39 percent in 1995. The standard deviation is important because the higher the deviation, particularly within groups of similar products, the greater the likelihood that the decisions of consumers and producers are distorted by the tariff structure, since the products within a group are highly substitutable. A similar picture can also be found across broad industry groups, with the exception of wood products (Table 2.2). Looking at an even more disaggregated level, however, Fane and Condon found that several industries experienced a significant increase in the RERP between 1987 and 1995. The few important ones were milled cereals, non-alcoholic beverages, leather and plywood.

Included in Table 2.1 is the anti-trade bias (ATB), which measures the extent to which the overall system of tariff, export taxes and NTBs inhibit trade (Fane and Condon 1996, p.37). The ATB fell from 50 per cent in 1987 to 28 per cent in 1995 - indicating that policy decision reduced the anti-export bias, which was in place during protectionist industrialisation.

Table 2.1 Estimates of Real Effective Rates of Protection (%), 1987 and 1995

Sector	1987	1995
Agriculture	9	4
Forestry, fishing and hunting	-36	-34
Mining and quarrying	-12	-6
Manufacturing (excluding oil and gas)	66	16
Manufacturing (including oil and gas)	32	11
Anti-trade bias (ATB),in %	50	28
Standard deviation of RERPs		
Manufacturing (excluding oil and gas)	42	26
All sectors	102	39

Source: adapted from Fane and Condon (1996, p.40)

Table 2.2 Estimates of Real Effective Rates of Protection (%) in 1987 and 1995 by broad industry groups in non-oil and gas manufacturing

Industry	1987	1995
Food, beverages and tobacco	106	21
Textiles, clothing and footwear	78	-9
Wood products	10	27
Paper products	15	2
Chemicals	44	-7
Non-metal products	38	15
Basic metals	-1	-4
Machinery, equipment and transportation	121	86
Other manufacturing	95	12

Source: adapted from Fane and Condon (1996, p.39)

2.3 Several features of industrialisation in Indonesia

The previous section's summary tells us that during the three decades before the 1997/98 crisis, there was a small number of dramatic changes in policy that affected the national industrialisation process. This section addresses this subject by way of discussing several important features of the industrialisation. In particular, it focuses on the following issues: structural change, export performance and structure, and the pattern of ownership and concentration.

2.3.1 Structural change

There was rapid structural transformation in the Indonesian economy during these 30 years. This is shown in Table 2.3. The share of the agriculture sector in GDP declined from 45 per cent in 1975 to 17 per cent in 1995, while the share in manufacturing increased from 12 to 24 per cent. Other non-manufacturing industry sectors, such mining and quarrying, utilities and construction, also experienced rapid increases in the share. This pattern suggests the shift of resources from agriculture to the industry sector and is consistent with the stylised facts on economic transformation in a country.

Table 2.3 Output share (%) in the Indonesian economy by sectors, 1970-1995

Sectors	1970	1975	1980	1985	1990	1995
Agriculture	44.8	28.8	22.6	23.2	21.5	17.1
Mining and Quarrying	5.4	19.9	25	14	13.4	8.8
Manufacturing	12.2	11.9	14.8	16	19.9	24.1
Electricity, Gas and Water Supply	0.2	0.3	0.3	0.4	0.6	1.2
Construction	3.1	4.6	5	5.5	5.5	7.6
Trade, Hotel and Restaurant	13.7	13.8	13.4	15.9	16.9	16.6
Transport and Communication	3.3	4.5	4.4	6.3	5.6	6.8
Services	17.3	16.2	14.5	18.7	16.6	17.8
Gross Domestic Product (GDP)	100	100	100	100	100	100

Source: National Income Statistics, *Badan Pusat Statistik* (BPS)

Note: Share of output is measured at current prices.

Accompanying this rapid overall change structural has been structural change within the manufacturing sector. This is demonstrated in Table 2.4, which shows the share of output and employment of broad non-oil manufacturing industries from 1975 to 1995. Focusing first on the period 1975-85, it is clear how the state-intervention and protectionist policy changed the structure of industry. The share of heavy processing and metal goods industries rose substantially, by about 7 percentage points, while food processing and footloose labour-intensive industries declined by about 14 and 3 percentage points respectively. The share of wood and paper products industries, meanwhile, grew rapidly.

However, there was a turnaround in the period 1985-95. The share of heavy processing and metal goods industries began to decrease. This can be explained by the impact of the decline in oil revenue in the 1980s, which forced the government to either cancel or postpone projects in these industries. In contrast, the share of footloose labour-intensive industries, dominated by textiles, garments and footwear, and metal goods industries increased. The share of wood and wood products industries continued to rise, particularly as the furniture and the paper products industries became increasingly important (Hill 1996). These patterns are also observable for the industries' share in terms of employment.

Table 2.4 Share of output and employment by broad industry groups (% of total non-oil/gas manufacturing), 1975-1995

a) Share of output

Industry group	ISIC	1975	1980	1985	1990	1995
Food processing	31	43.3	37.9	28.8	27.5	22.4
Footloose labor-intensive	(32+39)	15.1	12.4	12.3	15.0	18.6
Wood and paper products	(33+34)	6.9	9.2	12.0	15.6	13.0
Heavy processing	(35+36)	18.2	21.2	24.8	18.0	16.5
Metal goods	(37+38)	16.4	19.3	22.2	23.8	29.4

b) Share of employment

Industry group	ISIC	1975	1980	1985	1990	1995
Food processing	31	38.8	32.8	30.9	23.1	21.5
Footloose labor-intensive	(32+39)	28.8	26.6	23.4	28.6	33.3
Wood and paper products	(33+34)	8.2	10.1	14.2	18.5	16.5
Heavy processing	(35+36)	13.6	17.1	20.0	18.7	15.6
Metal goods	(37+38)	10.6	13.4	11.6	11.0	13.1

Source: Annual manufacturing survey, BPS

Note: Definition for industry group follows that of Hill (1996)

While the expansion in footloose industries can be attributed to the policy reforms, there is no clear indication as to what factors contributed to the expansion of metal goods industries. Aswicahyono (1998) attributed this result to high government investment during the oil boom period, which provided the industries with room to expand. The expansion, however, might have been the result of increased foreign participation. With advanced technology brought into the country by multinationals, firms in these industries should have been able to improve efficiency, and hence, performance.

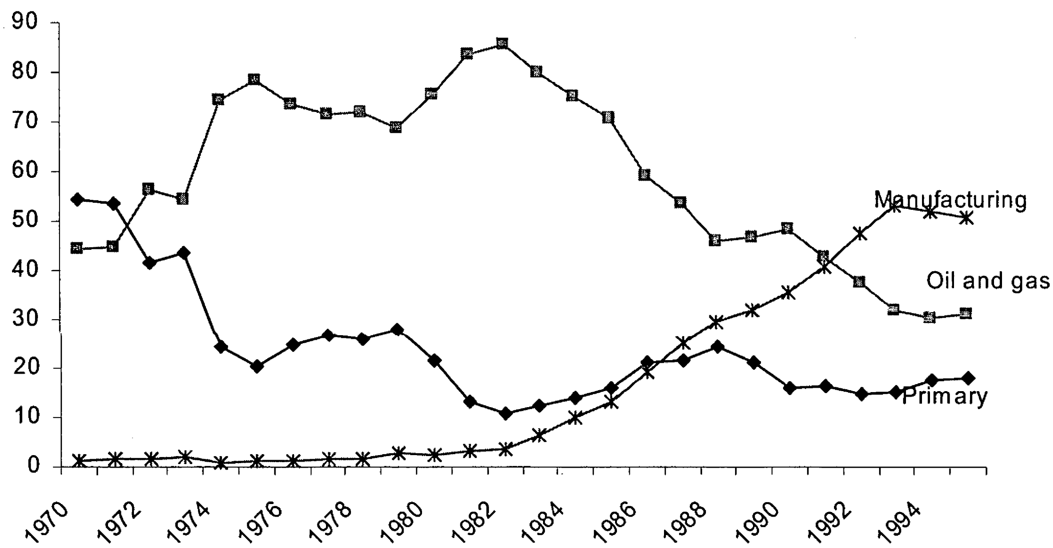
Overall, the pattern of structural change in Indonesian manufacturing reflects the country's resource endowment (Bird 1999) and is a pattern observed in some other developing countries (Hill 1996). That is, declining shares of traditional resource-intensive products but rising shares of labour- and capital-intensive products as industry employs more sophisticated technology. The pattern also seems to move closely with the dynamics of policy over the course of industrialisation. With the dramatic reforms in the 1980s, this implies that

Indonesian manufacturing had become more integrated with the global economy. The data in Table 2.4, in fact, provide evidence of this.

2.3.2 Export performance and structure

Reflecting the import substitution industrialisation, the export of manufacturing goods was never important in Indonesia's export outcomes during the oil boom period. It was not until the early 1980s that there was a change of outlook, as the government embarked on strategy to promote exports.

Figure 2.1 Composition of exports by broad sector in the economy, 1970-95 (% of total exports)



Source: calculated from export statistics, BPS, various years

The impact of trade reforms during the period 1985-90 on manufacturing exports is evident in Figure 2.1. The share of manufacturing exports increased significantly from 1982 to 1992 and reached about 50 per cent of Indonesia's total exports at the end of the period. In terms of growth, Table 2.5 shows that manufacturing exports have grown at a very high rate between 1985 and 1995. The table shows the main manufacturing products that contributed to the high growth included wood and paper products, processed food, textiles and garments, and electrical products.

Table 2.5 Major Indonesian manufacturing exports, 1985 and 1995

Product	Value (US$ million)		Average growth
	1985	1995	
Pharmaceutical	4	4	2
Plywood	825	3462	32
Sawnwood	307	454	5
Other Processed Wood	53	1074	193
Aluminum	246	475	9
Garments	340	3316	88
Other Textiles	220	2816	118
Cattle Fodder	68	142	11
Essential Oils	50	80	6
Fatty Acids	59	327	45
Electrical Apparatus	144	922	54
Processed Food	57	819	134
Cement	22	8	-6
Plaited Articles	13	66	41
Chemicals	57	519	82
Fertilizer	80	277	25
Leather and Leather Goods	44	65	5
Paper and Paper Goods	21	1011	474
Other Industrial	354	9960	272

Source: Export statistics, BPS

Pangestu (1996, p.52) pointed out that the positive impact of trade reforms on manufacturing export performance was moderated by excess capacity, which existed because of weak domestic demand and a favourable world market. For the latter, it was particularly true in the case of textile and garment, primarily because Indonesia had unfilled export quotas until the late 1980s (Hill 1996).

Table 2.6 shows the share of manufacturing exports by factor intensity. Three characteristics are worth highlighting. First, impressive manufacturing exports until the early 1990s tended to lie in sectors in which Indonesia had a comparative advantage. This can be seen clearly from the pattern of unskilled labour intensive (ULI) group, which increased from 34 per cent in 1985 to 47 per cent in 1990. The share, however, began to decrease in 1993 and was 42 percent in 1995. The most important source for this decline has been the drop in the share of textiles and garments.

Table 2.6 share of exports by factor intensity (% of total manufacturing exports), 1980-95

SITC	Products	1980	1985	1987	1990	1993	1995
	Resource intensive (NRI)	**24**	**49**	**52**	**37**	**28**	**22**
631	Veneers, Plywood, etc	14	46	49	31	24	17
	Unskilled labour intensive (ULI)	**53**	**34**	**32**	**47**	**46**	**42**
65	Textile, yarn, fabric etc.	9	12	12	14	14	12
82	Furniture	1	0	1	3	3	4
84	Clothing	20	17	15	18	18	15
85	Footwear	0	0	1	6	8	9
893	Plastic products	0	0	0	1	1	1
894	Toys and sporting goods	0	0	0	0	1	2
899	Other manufactured goods	1	0	0	1	1	1
	Technology intensive (TI)	**12**	**8**	**5**	**6**	**7**	**11**
71	Machinery, non-electric	1	1	0	1	2	4
722	Electrical powered machinery	0	0	0	0	1	1
	Human capital intensive (HCI)	**12**	**9**	**11**	**10**	**15**	**19**
62	Rubber manufacturer n.e.s	0	0	1	1	1	1
64	Paper, paperboard and manufacturing	1	1	3	2	3	4
724	Telecommunications equipment	0	0	0	1	3	4

Source: Export statistics, BPS, various issues

Note: Classification of the products by factor intensity follows that developed by Ariff and Hill (1985), see Appendix 2.1.

While the case is clear for the ULI group, the comparative advantage argument does not seem to hold with the pattern of the natural resource intensive (NRI) group. Its share decreased from 49 per cent in 1985 to 37 and 22 per cent in 1990 and 1995 respectively. The decrease, however, was largely caused by the declining for demand and price of plywood, the product which dominates exports of this group, in international markets (Aswicahyono and Pangestu 2000).

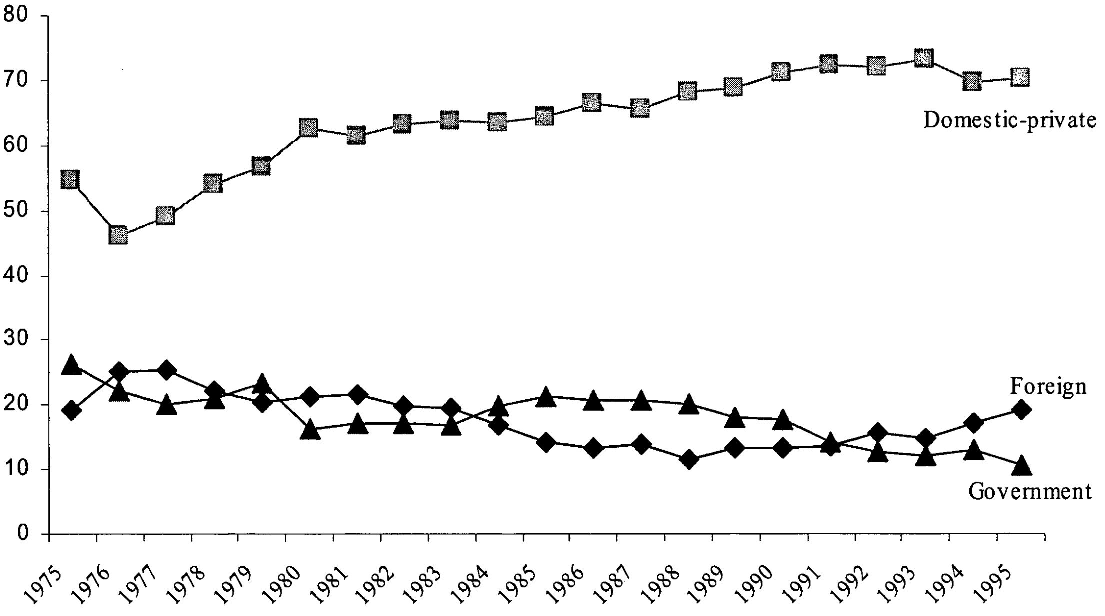
The second feature was the growing importance of exports from the capital intensive industry group. Export share of human capital and technology intensive (HCI and TI respectively) groups increased between 1985 and 1995. The share increased from 9 per cent in 1985 to 19 per cent in 1995 for HCI group, and from 8 per cent to 11 per cent for TI group. This pattern is consistent with the general trend in the stages of industrialisation where capital- and technology-intensive industries take over labour-intensive industry as the process of industrialisation progressively moves (Hill and Phillips 1997). The pattern, therefore, provides an indication of the positive impact of reforms in the investment regime and is consistent with the pattern observed earlier of structural change in manufacturing. The foreign investment reforms had likely increased the flow and adoption of technology in Indonesian manufacturing.

The third feature was increasing diversification of Indonesia's exports. In 1987, manufacturing exports were dominated by plywood, textiles and garments, all of which accounted for 76 per cent of total manufacturing exports. By 1995, the total share of these products declined to 44 per cent. The share of other products, such as footwear, furniture, non-electrical machinery, telecommunication equipment and paper products, had been increasing since the late 1980s. The total share of these products reached 24 per cent in 1995 as compared to 3 per cent in 1985.

2.3.3 Ownership

The pattern of ownership in Indonesian manufacturing appears to be closely related to the dynamics of policies summarised earlier. This is shown by looking at the pattern of ownership share in the manufacturing industry from 1975 to 1995 (Figure 2.2). Two observations are worth mentioning regarding the import substitution period (i.e. early 1970s to mid 1980s). First, the share of government ownership was slightly above 20 per cent in the period 1975-80 and most of the 1980s. As discussed, this was probably related to the massive oil revenue from the 1970s' oil boom that enabled the government to finance investment in heavy industries. The temporary decline in the early 1980s was mainly due to the lag between investment and production. Second, the share of foreign ownership had been high in the early 1980s, with a declining trend, before it rose again in late 1980s. This was likely due to high foreign participation in capital-intensive industries in that period. Bird (1999) shows that more than half of the foreign firms invested in chemicals (ISIC 35), and machinery and transportation (ISIC 38).

Figure 2.2 Ownership share in Indonesian manufacturing, 1975-95 (% of total non-oil manufacturing's value added)



Source: calculated annual medium and large manufacturing, BPS

Substantial changes in the patterns are evident for the export orientation period (1985-95). The share of government ownership declined over this period and reached 10 per cent in 1995. In contrast, the share of foreign and domestic-private ownership increased. The share of domestic-private ownership, after it was broadly constant 1981 to 1985, began to increase and reached a peak of 73 percent in 1993, before declining in 1994. The share of foreign ownership only began to increase in the early 1990s. This increase, however, had only been small between 1990 and 1992 (i.e. about 1 percentage point). It was only in the 1993-95 period that the share increased by about 5 percentage points. This considerable increase reflects the positive effects of further investment reform in the early 1990s.

According to Hill (1996), the increased role of foreign ownership in Indonesian manufacturing reflects the interplay between policy and industrial organisation factors. He demonstrated that when entry was permitted, foreign firms tended to enter the industries in which they could exploit their advantages in technology, brand names and knowledge of the international market.

Table 2.7 highlights the importance of policy in determining foreign participation. Foreign participation in textiles, garment and footwear industries (ISIC 32) seemed to occur only after the policy reforms in the 1980s. The share of foreign plants in these industries increased significantly from 10 per cent in 1980 to 19 per cent in 1995. Similarly, in terms of output (value added), the share increased from 9 to 15 per cent between the two years.[3] This pattern points to a close relationship between foreign ownership and exporting behaviour, which is strongly supported by the theory of multinationals (e.g. Caves 1982; Dunning 1993). Meanwhile, the share in heavy processing industries (i.e. ISIC 37 and 38) also increased significantly between 1980 and 1995. This may well be attributed to the liberalisation in the investment regime. In this respect, it is particularly evident for the share in the machinery industry (ISIC 38) where the increase was considerably high during 1990-1995 compared to the earlier periods. As noted earlier, a substantial reform encouraging higher foreign participation was undertaken within this period (i.e. 1994).

Table 2.7 Distribution of foreign plants by broad industry groups (%), 1980-95

a) In terms of plant numbers

ISIC	Industry	1980	1985	1990	1995
31	Food and tobacco products	13	12	12	11
32	Textile, garment and footwear	10	11	13	19
33	Wood products, incl. furniture	15	17	14	9
34	Paper and paper products	3	2	2	3
35	Chemical, rubber and plastics	27	27	27	18
36	Non-metallic mineral products	4	4	3	4
37	Basic metal industries	2	1	4	3
38	Machinery and equipment	25	25	23	28
39	Other manufacturing	2	1	3	6
Total		100	100	100	100

b) In terms of value added

ISIC	Industry	1980	1985	1990	1995
31	Food and tobacco products	27	16	10	9
32	Textile, garment and footwear	9	16	11	15
33	Wood products, incl. furniture	3	5	5	4
34	Paper and paper products	1	1	6	5
35	Chemical, rubber and plastics	22	24	22	19
36	Non-metallic mineral products	11	11	4	3
37	Basic metal industries	3	6	10	11
38	Machinery and equipment	24	20	31	33
39	Other manufacturing	1	1	0	2
Total		100	100	100	100

Source: Annual survey of medium and large manufacturing plants, BPS

Note: Foreign plants are defined as plants with any foreign ownership, i.e. foreign share is greater than zero.

[3] In this study, a foreign plant is defined as any firms with non-zero foreign shares.

Another important feature of foreign firms in Indonesian manufacturing is their close relationship with export orientation. This is demonstrated by Table 2.8 which shows the average export-output ratios of foreign and domestic private plants in manufacturing for 1990 and 1995. Focusing first on the two years' average values (column 5), foreign plants have significantly higher export-output ratios compared to domestic private plants. For manufacturing sector as a whole, these ratios were 0.32 for foreign plants and 0.08 for domestic private plants. The same conclusion is also observable across broad industry groups. Turning to the pattern overtime (column 3 and 4), the ratio of foreign plants increased by 82, per cent from 0.22 in 1990 to 0.42 in 1995. This is an exceptional increase compared to the 38 per cent increase in the ratio of domestic plants.

Table 2.8 Average of plants' ratio of exported to total output by ownership and industries

a) Foreign plants

ISIC	Industry	1990 (3)	1995 (4)	Average of 1990 & 1995 (5)	Percentage increase between 1990 and 1995 (6)
3	**Manufacturing**	**0.23**	**0.42**	**0.32**	**0.82**
31	Food and tobacco products	0.13	0.28	0.20	1.26
32	Textile, garment and footwear	0.41	0.57	0.49	0.38
33	Wood products, incl. furniture	0.52	0.72	0.62	0.39
34	Paper and paper products	0.15	0.25	0.20	0.74
35	Chemical, rubber and plastics	0.17	0.27	0.22	0.60
36	Non-metallic mineral products	0.09	0.24	0.16	1.64
37	Basic metal industries	0.10	0.34	0.22	2.27
38	Machinery and equipment	0.13	0.39	0.26	1.98
39	Other manufacturing	0.41	0.63	0.52	0.54

b) Domestic plants

ISIC	Industry	1990 (3)	1995 (4)	Average of 1990 & 1995 (5)	Percentage increase between 1990 and 1995 (6)
3	**Manufacturing**	**0.07**	**0.10**	**0.08**	**0.38**
31	Food and tobacco products	0.04	0.05	0.04	0.33
32	Textile, garment and footwear	0.08	0.11	0.10	0.27
33	Wood products, incl. furniture	0.22	0.29	0.25	0.34
34	Paper and paper products	0.01	0.03	0.02	2.77
35	Chemical, rubber and plastics	0.07	0.08	0.07	0.06
36	Non-metallic mineral products	0.02	0.02	0.02	-0.05
37	Basic metal industries	0.04	0.06	0.05	0.54
38	Machinery and equipment	0.02	0.04	0.03	1.09
39	Other manufacturing	0.07	0.20	0.14	1.68

Source: Annual survey of medium and large manufacturing plants, BPS

Notes: Foreign plants are defined as plants with any foreign ownership, i.e. foreign share is greater than zero
Domestic plants are defined as plants with fully domestic ownership, i.e. domestic share is equal to 100 percent

2.3.4 Concentration

Another feature of industrialisation in Indonesia is the steady decline in the level of concentration. In a comprehensive study, Bird (1999) shows that the simple average of CR4 (i.e. the market share of the largest four plants in an industry) decreased from 64 per cent in 1975 to 51 per cent in 1990 (Table 2.9), despite a short rising trend between 1990 and 1993.

The same inference can also be drawn out from the trend in the weighted averages of the ratio.

Table 2.9 average four-firm concentration ratio (CR4), 1975-93

	Simple average	Weighted average
1975	63.6	55.0
1976	61.9	53.8
1977	61.5	54.0
1978	61.2	54.3
1979	60.0	53.6
1980	57.9	53.5
1981	57.5	53.1
1982	56.0	50.9
1983	54.5	50.0
1984	53.6	48.4
1985	52.6	46.6
1986	52.4	45.9
1987	52.3	44.3
1988	51.8	44.2
1989	52.1	43.8
1990	50.9	42.5
1991	51.8	43.3
1992	53.7	43.4
1993	53.5	44.0

Source: Bird (1999, p.67)

Notes: CR4 is defined as the market share of the largest four plants in an industry.

Whether the declining trend in concentration level had been affected by the economic reforms in 1980s, however, is not clear. On one the hand the declining trend has been a stylised fact in the process of industrialisation. On the other, the trade reform in the 1980s should at least have led to some increased in competition from abroad through the restructuring process (Hill 1996). Despite this ambiguity, there is some evidence the declining trend was affected by the reform. Bird (1999) demonstrated that average concentration for export-competing industries (not shown here) in particular garments and plywood, considerably declined during the period 1986-91. He attributed this decline mostly to the increased export opportunities that allow domestic industries to support greater numbers of producers.

2.4 Summary

This chapter presents an overview of industrialisation in Indonesia during the three decades up to the crisis of 1997-98. Over this time, major changes in policy direction took place in response to various events experienced by the Indonesian economy. After about 15 years of import substitution policy, sheltered by large oil revenues, the policy direction shifted dramatically towards outward orientation. This was assisted by a series of bold and comprehensive reforms aimed at liberalising the economy, increasing investment and promoting exports.

The impact of the policy changes on industrialisation is apparent. The Indonesian manufacturing sector transformed rapidly during this time and had become an important source of growth by the mid 1990s. The share of the sector in GDP increased from 12 per cent in 1975 to 24 per cent in 1995. In addition, some other features of industrialisation accompanied is rapid structural change. This chapter highlights the rapid change in the structure of Indonesia's manufacturing exports, reflecting the country's comparative advantage, increasing foreign participation (particularly after the major investment reforms during 1992-94) and declining, although high, concentration. Understanding that these have been the salient features of industrialisation in Indonesia will be important for analysing the diverse response of individual firms in subsequent chapters.

Appendix 2.1 Classification of manufacturing sector according to factor intensity

SITC	Industry
	Agricultural resource intensive
61	Leather, dress fur, etc.
63	Wood, cork manufactures
	Mineral resource intensive
661-3	Non-metal building products and minerals
667	Pearls, precious, semiprecious stones
671	Pig iron, etc.
	Unskilled labour intensive
54	Medical products
65	Textile, yarn, fabric etc.
664-6	Glass, glassware, pottery
695-7	Tools, cutlery, metal household equip
729	Electrical machinery
735	Ship and boat
81-5	Plumbing, heating, lighting, etc. equipment; furniture, travel goods, clothing footwear
893-5	articles of plastic n.e.s.; toys; sporting goods; office supplies, n.e.s.
899	Other manufactured goods
951	War firearms, ammunition
	Technology intensive
51	Chemical elements, compounds
56-9	Fertilisers, explosives, plastics, chemicals n.e.s
71	Machinery, non-electric
722	Electrical powered machinery
723	Electrical distributive machinery
726	Electro-medical, X-ray equipment
734	Aircraft
861-3	Instruments, photo, cinema supplies, movie
	Human capital intensive
53	Dyes, tanning, colour products
55	Perfumes, cleaning etc. products
62	Rubber manufacturers n.e.s
64	Paper, paperboard and manufacturing
672-9	Iron and steel excluding 670-1
691-4	Metal manufactures excluding 695-9
698-9	Metal manufactures n.e.s
724	Telecommunications equipment
725	Domestic electric equipment
731-3	Railway and road vehicles
864	Watches and clocks
891	Sound recorders, producers
892	Printed matter
896	Works of art etc
897	Gold, silverware, jewellery

Source: Ariff and Hill (1985, p.241-42).

Chapter 3

The 1997/98 Economic Crisis in Indonesia

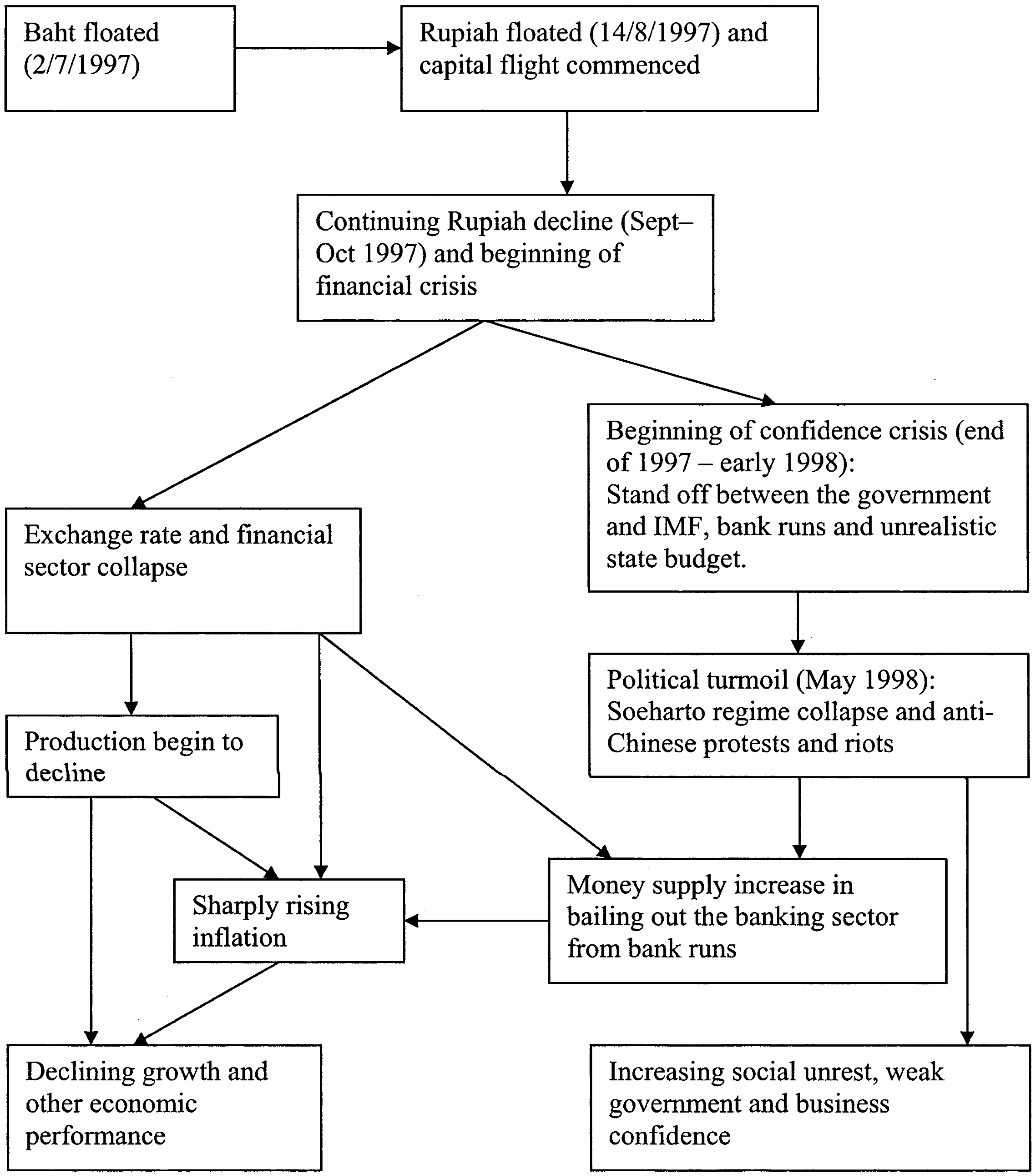
3.1 Introduction

The previous chapter noted that the Indonesian economy had transformed rapidly in the 30 years leading up to 1996. The crisis in 1997/98 dramatically interrupted this trend. The economy contracted severely by about 14 per cent in 1998 and the nominal exchange rate lost almost 70 per cent of its value in 1997-98. Together with the previous chapter, this one completes the historical introduction to the crisis, setting the scene for the empirical analysis that follows. This chapter begins by describing the path of the crisis and is followed by a general description of its impact on the economy.

3.2 The course of the crisis

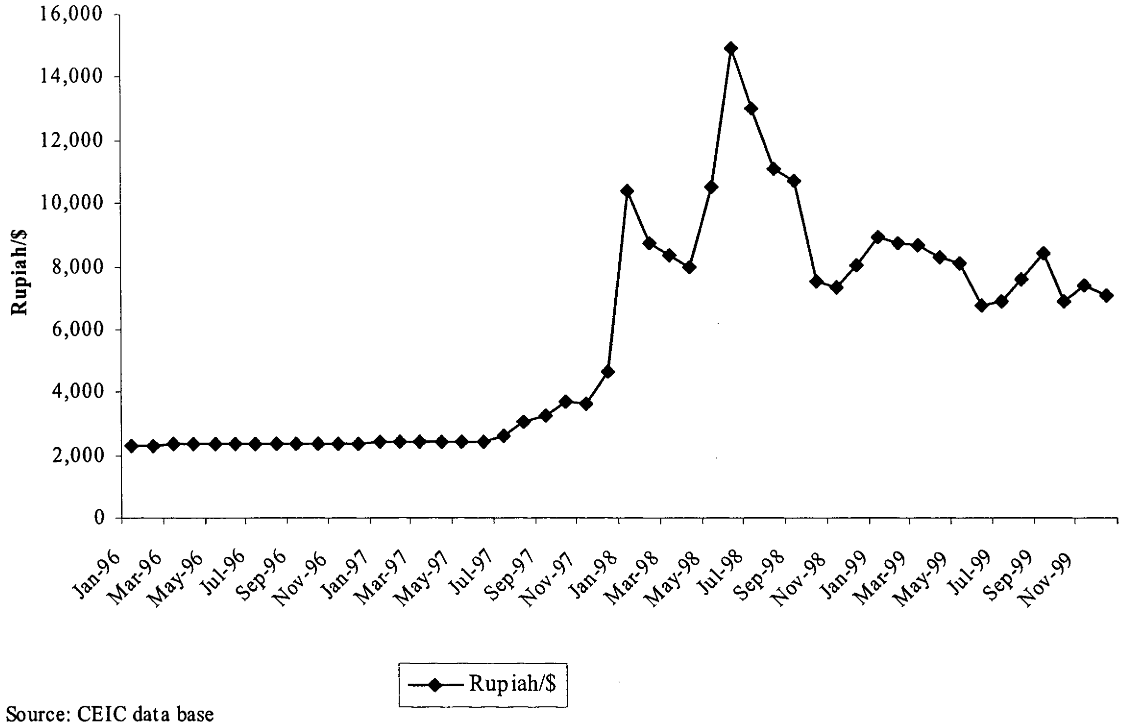
The 1997/98 crisis in Indonesia was unique because of the interaction between economic, political and social factors. Indeed, as becomes clear throughout the chapter, the economy's performance deviated drastically from that of other economies affected by the same turmoil. Because the crisis was so unique, this section focuses on the way it unfolded. At the risk of oversimplification, it is possible to identify six sub-phases in the course of the crisis which covers the period 1997. The flow of major events and trends in the exchange rate are provided in Figure 3.1 and Figure 3.2 respectively.

Figure 3.1 Indonesia's 1997/98 Economic Crisis: a summary



Source: Adapted from Hill (1999)

Figure 3.2 Exchange rate Rupiah to $, January 1996 – December 1999



Source: CEIC data base

August-September 1997: the beginning

The problems in Indonesia began through a contagion effect from Thailand's economic crisis. There was pressure on the Rupiah as soon as the Thai government decide to float the Baht, on July 2, 1997. On July 21, the Rupiah fell by 7 per cent, prompting Bank Indonesia (BI) to intervene. Faced with steady and strong pressure for the Rupiah's depreciation, but reluctant to squander its reserves, BI finally freely floated the Rupiah on August 14. At the same time, it also responded by tightening liquidity. The one-month Bank Indonesia Certificate (*Sertifikat Bank Indonesia, SBI*) rate was increased from 14 to 22 per cent. The policy, however, turned out to be ineffective as the currency continued to fall.

The tight monetary policy was not effective partly because the market expected a clear signal from the government to reform the economy, which only came three weeks after the Rupiah was floated. In mid September, the government outlined its program to tackle the currency crisis. It had five objectives: (1) stabilisation of the Rupiah to a new equilibrium; (2) fiscal consolidation; (3) reduction of the current account deficit; (4) strengthening of the banking sector; and (5) strengthening of the private corporate sector. Following the program announcement the Rupiah stabilised at about Rp3000/$, but only until the third week of

September. The combination of a growing concern about private companies having difficulty meeting their external obligation, and the weakened regional currency and stock markets, contributed to the Rupiah's further depreciation. By early October, the Rupiah had depreciated by 35 per cent. By this time the Jakarta Stock Market Index had also fallen by 44 per cent.

October 1997-January 1998: deteriorating situation

On October 8, the government decided to seek assistance from the International Monetary Fund (IMF). The motivation for inviting the IMF, however, was rather unclear. In his initial statement, Finance Minister Mar'ie Muhammad, explained that what the government sought from the IMF was technical assistance. This was primarily aimed at strengthening the financial system, and the possibility of financial support would only be explored as a precaution. There was no clear reason as to why the government took this position. Nevertheless, there was a sense at that time that President Soeharto was reluctant to draw on IMF assistance (Soesastro and Basri 1998).

Many saw the involvement of the IMF as necessary to restore market confidence. Its inclusion was also seen by the market, particularly the international community, as an opportunity to reform the country's problems with cronyism, corruption and collusion. This was because the terms set by the IMF were expected to be politically difficult (Soesastro and Basri 1998).

An agreement with the IMF was reached on October 31, providing Indonesia with a $43 billion package.[1] Unlike other IMF packages, the Indonesian agreement included measures affecting the real sector of the economy. While these measures were unusual for an IMF agreement, it is likely that they were proposed voluntarily by the Indonesian government as a way of increasing the credibility of the package, having taken into accounts the comments and expectations of the general public and international markets (Soesastro and Basri 1998).

The package included efforts to restore the health of the financial sector, adjustment in fiscal, monetary and exchange rate policies, and reforms in the real sector. These reforms were to be implemented over a three-year period and tightly monitored by the IMF, the World Bank and the Asian Development Bank (ADB). On November 1, one day after the agreement was

[1] The package consisted of a 'first line of fund': $23 billion provided by the IMF, The World Bank and The ADB, and a 'second line of funds': $20 billion provided by the bilateral donors.

reached, the government announced the closure of 16 commercial banks without provision of a sufficient deposit guarantee. This created a panic in the country, and led to sudden withdrawals of savings even from banks which were considered safe. On November 3, the government announced some macro- and micro-economic policies to implement the reforms required by the IMF package. The initial reaction from the market was positive. Combined with a joint effort between BI, the Bank of Tokyo and the Monetary Authority of Singapore to intervene in the market, the currency strengthened from Rp3600/$ at the end of October to about Rp3200/$.

This optimism, however, did not last long. The currency depreciated to a level about Rp4000/$. There are several reasons for the declining optimism. First, there was stronger pressure on the regional currency market because an economic crisis had hit Korea. Second, there were some government decisions that raised questions about its credibility in implementing the reforms. One example of this was the reversal of some large projects which were initially put on hold. It is worth mentioning here that most of these projects had links to Soeharto-family businesses. Third, demand for dollars was expected to rise as the issue of burgeoning private-sector debt became apparent. While there was no exact figure about the extent of this debt, it was widely believed to be substantial, ranging from $35 to $50 million. Finally there was a substantial losts of credibility for domestic commercial banks, partly as a result of the lack of deposit-insurance schemes. There was an increasing number of cash withdrawals from banks from late November.

All of these external and internal factors further weakened the currency. It reached Rp6000/$ in mid of December.

The situation deteriorated even further in January 1998. It began with the announcement of the draft state budget. The budget was highly unrealistic. It assumed an exchange rate of Rp.4000/$, compared to the prevailing rate of Rp.8000/$ at that time, economic growth of 4 per cent and an inflation rate of 9 per cent. These unrealistic assumptions illustrated the stand off between the government, particularly the president and the IMF.[2] The unrealistic assumptions, combined with the growing gap with the IMF, were responded too negatively by the market. The currency weakened further to reach the psychologically important level of Rp.10,000/$.

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[2] The IMF's disappointment was expressed in the *Washington Post* on January 8, 1998.

On January 15, the second agreement with the IMF was signed. Although a good program seemed to be in place, the market was not convinced. The currency continued to fall and reached Rp17,000/$ at the end of January. Several reasons explained the further deterioration, including the questionable credibility of an economic council set up by the president, the absence of measures related to bank and private-debt restructuring programs, and concerns about the promotion of BJ Habibie as vice-president.

February-April 1998: mounting crisis of confidence

This was a period of deteriorating confidence. The president seemed to lose faith in his economic advisers and neglected them for some time. He seemed to only listen to close associates and family members (Johnson 1998) and, without consulting his economic minister and advisers, he considered implementing the controversial plan for a Currency Board System (CBS). Serious consideration to implement the CBS increased the stand off between the president and the IMF. In response, the IMF delayed disbursement of the second instalment because of great concern about the government's compliance to its agreement.

In addition to the CBS proposal, Soeharto's seventh cabinet, after the presidential election in March, was poorly-received by the public and the market. Apart from the instalment of Habibie as vice president, Soeharto included a few of his associates and family members in the cabinet. Further, the cabinet's composition reinforced the view that the president neglected the opinions of the public and the international community (Johnson 1998).

It is worth noting that, despite the mounting crisis of confidence, the third agreement with the IMF was reached during this period. The main difference between the third and the second agreement was a willingness to consider government assistance in solving the corporate external-debt problem (Johnson 1998). In implementing this, the government set up the Indonesian Debt Restructuring Agency (INDRA) in July 1998. It provided a guarantee on the exchange rate and the availability of foreign exchange for debtors who agree with creditors to restructure their external debt (Johnson 1998).

May 1998: political turmoil

May 1998 was the chaotic month. The government's announcement of increased petrol and electricity prices, by 70 per cent and 20 per cent respectively, escalated the political tension. Students were protesting all over Indonesia, demanding a change in political leadership. A shooting incident on May 14 involving some students at the Trisakti University, led to devastating riots, looting and destruction, specifically targeting the Sino-Indonesian community. These events led to political chaos, and most significantly, weaker support for the president from the military and his cabinet members. This culminated in Soeharto's resignation, and the handing over of leadership to Habibie.

June-August 1998: the new administration

President Habibie announced his new cabinet on May 22, 1998, and there was widespread approval of his choice of economic ministers. The optimism, however, stood in contrast to the enormous and complex problem that the government had to solve. For example, efforts to solve the external debt problem were implemented too slowly. Cameron (1999) reported that, until December 1999, only one company was interested in the debt-restructuring scheme designed by INDRA. The political environment was also unfavourable. Many projects were put on hold and capital flight continued (Hill 1999).

Uncertainty surrounded the progress of economic recovery and, combined with problems with the Japanese economy, the economic situation deteriorated. The Rupiah depreciated further to reach about Rp14,000/$ in August 1998 (Figure 3.2). At the same time, BI was implementing excessive monetary tightening which pushed inflation up. High seriously damaged the cash flow of companies and consequently stopped activities in the real sector. By this time it was clear that the financial problems had translated into a serious economic crisis.

September 1998-March 1999: mixed trends

Optimism for recovery began to occur in September 1998. The strategy to have high interest rates seemed to work as the growth in liquidity had slowed down. Some improvements in the regional environment, such as optimism with the Japanese, Korean and Thai economies, were also evident. As a result of this optimism, the Rupiah strengthened to about Rp7500/$, a level that many considered manageable.

The optimism, however, was overshadowed by great uncertainty. Externally, it was not clear if the improvement in the region was robust. Internally, banking-sector and external-debt restructuring had been progressing slowly. A lack of transparency in decision making and problems in the legal system were the major issues constraining the recovery process. In addition, the social instability had not ended, and ethnic and religious violence continued.

3.3 General description on the impact of the crisis

To provide a deeper understanding of the magnitude of the crisis, this section provides a description of the impact it had on several economic indicators. The impact of the crisis on trade policy will be also presented. This is because, as noted, the agreements with the IMF included some reforms targeted at the real sector of the economy.

3.3.1 Economic indicators

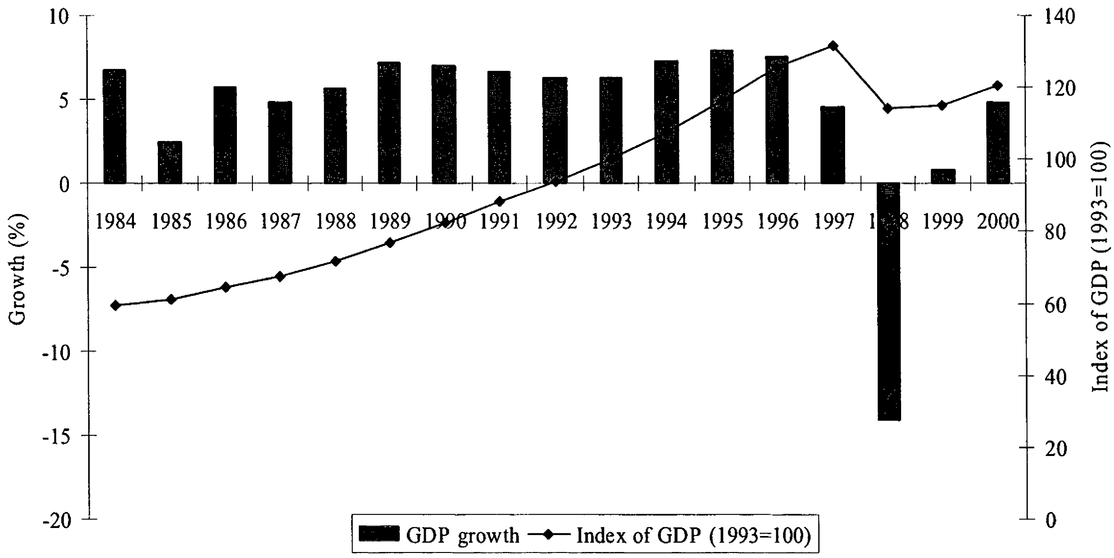
Economic growth

The crisis severely affected Indonesia's economy. Figure 3.3 shows it contracted by 14.1 per cent in 1998 after growing rapidly, at the rate of 6 per cent on average, in the 30 years before the crisis. Viewed in historical context, the contraction in 1998 was far deeper than any other recession that Indonesia had experienced (Hill 1999). Indeed, the figure shows the growth rate in 1985, when the economy adjusted from the fall in the oil price, was still positive at 2.4 per cent.

The severe impact of the crisis appears even harsher when the short-term trend in the GDP is considered. The GDP index in Figure 3.3 shows that the level of the GDP in 1998 was about the same of that in 1995, implying that the crisis had 'cost' Indonesia three years of economic growth. Further, comparing the GDP index with the index representing the level of GDP that the economy would have attained if there had not been any crisis (and the economy had grown at the typical 1990s' rate of 7 per cent p.a.), the magnitude of contraction in 1998 was greater. It was about 20 per cent lower than the level that would have been expected had there been no crisis.

In spite of the deep contraction, the economy began to recover in 1999, which was indicated by 0.8 per cent growth in they year. By 2000, the rate of growth was back to the 1997 rate at the beginning of the crisis, although well below the pre-crisis trend growth.

Figure 3.3 Annual GDP growth and index, 1984-2000 (%, 1993=100)



Source: National Income Statistics, BPS

Table 3.1 shows that the impact of the crisis was different across sectors in the economy. Focusing first on the peak of the crisis (1998) construction, finance and trade, hotel and restaurant were the most severely affected sectors. The massive contraction in construction sector was probably caused by the delay of many projects. Demand for cement in Indonesia's major cities was substantially reduced in early 1998 (Johnson 1998). The contraction in the finance sector largely reflected the difficulties faced by the banks. As shown by the figures, the contraction in this sector was largely explained by the bank, rather than the non-bank, financial sectors. Manufacturing, particularly non-oil and gas, contracted at about the economy-wide average. As later described in Chapter 6, there was large variation in the contraction across industries.

Table 3.1 GDP growth by broad sectors of economy (%), 1997-2000

Sectors	1997	1998	1999	2000
Agriculture	**1.0**	**-1.3**	**2.1**	**1.9**
Mining & Quarrying	**2.1**	**-2.8**	**-1.6**	**5.4**
Manufacturing Industries	**5.1**	**-12.2**	**3.9**	**5.8**
Oil & Gas	-2.0	3.6	6.6	-1.7
Non-oil & Gas	5.9	-14.0	3.5	6.8
Electricity, Gas & Water Supply	**11.7**	**3.0**	**7.9**	**7.3**
Construction	**7.1**	**-45.3**	**-1.9**	**5.5**
Trade, Hotel & Restaurant	**5.7**	**-20.1**	**-0.1**	**5.5**
Transport & Communication	**6.8**	**-16.4**	**-0.8**	**8.2**
Finance	**5.8**	**-31.0**	**-7.5**	**4.5**
Bank	4.9	-47.6	-14.7	5.4
Other non-bank financial sectors	6.8	-19.4	-0.9	4.1
Services	**3.6**	**-3.9**	**1.9**	**2.3**
Public Administration	1.2	-7.6	1.7	1.4
Private Services	7.6	1.9	2.3	3.7
Gross Domestic Product (GDP) growth	**4.59**	**-14.07**	**0.79**	**4.8**

Source: National Income Statistics, BPS

Turning to the early recovery period (1999-2000), much of the large variation and patterns recorded in 1998 persisted into the following year. Bank-financial and construction sectors contracted further, by 15 and 1.9 per cent respectively. Meanwhile, non-oil and gas manufacturing seemed to begin recovering as it grew by 3.5 per cent. Recovery appeared stable in 2000 as all sectors recorded positive growth. More importantly, the sectors which were hit hardly by the crisis grew at a rate above 4 per cent, including the bank-financial sectors and construction.

The data from the expenditure side of the national account provides more information on the impact of the crisis (Table 3.2). In 1998, private consumption declined moderately in contrast with the large decline of government consumption. The decline in private consumption reflected various survival strategies by households (Hill 1999), while the huge decline in government consumption was probably the result in the delay of many government projects.

The crisis severely affected investment and inventories. On an annual basis, these expenditure groups contracted by 40 and 291 per cent respectively. Meanwhile, exports increased only moderately despite a large exchange rate depreciation in this year, and imports contracted modestly.

Table 3.2 GDP growth by expenditure (%), 1997-2000

	1997	1998	1999	2000
Consumption Expenditure (CE)	**6.7**	**-7.4**	**4.2**	**2.0**
Private Consumption Expenditure	7.5	-6.4	4.5	1.6
Government Consumption Expenditure	0.1	-16.7	0.7	6.3
Gross Fixed Capital Formation	**8.2**	**-40.1**	**-20.1**	**15.5**
Change in Stock	**-56.4**	**-291.1**	**41.0**	**36.0**
Exports of Goods & Services	**7.5**	**10.6**	**-38.3**	**23.5**
Imports of Goods & Services	**13.7**	**-5.4**	**-52.2**	**23.1**

Source: National Income Statistics, BPS

While private consumption and inventories increased, expenditure on investment goods, exports and imports contracted even more. The beginning of the recovery only became apparent in 2000. The fact that expenditure on investment, inventories, exports and imports increased substantially in this year suggests the beginning of recovery.

Balance of payments

The impact of the crisis is also clearly reflected in the country's balance of payments (Table 3.3). The current account deficit had been declining between 1997 and 2000. The factors contributing to the decline, however, were slightly different across these years. For the fiscal year 1997/98 and 1998/99, the decline was mostly caused by the large contraction in imports and the surprisingly weak performance of exports. The table shows that imports fell by about $14 billion in 1997/98. By contrast the 1999/2000 decline was mostly driven by large increases in exports. The non-oil and gas exports increased by $9 billion in this fiscal year.

The trend observed in the current account was largely reflected on the capital account. Net capital outflow turned out to be negative in the fiscal year 1997/98 and continued to be so. Despite the signs of recovery, this suggests that business confidence had not fully recovered.

In fact, net capital flow from private direct investment had been negative and large in 1998/99 and 1999/2000.

As noted in the past two tables, exports failed to accelerate despite the large exchange rate depreciation during the crisis. This, however, was not only specific to Indonesia. Duttagupta and Spilimbergo (2004) demonstrated that weak export performance during the crisis was experienced by other countries affected by the 1997/98 turmoil in Asia. Several factors might explain this, including the decline in the price of export commodities, the effect of competitive devaluations in competitor countries and tightening credit markets. All of these factors are discussed in more detail in the next chapter.

Table 3.3 Balance of payments ($ billion), 1995-96-1999/2000

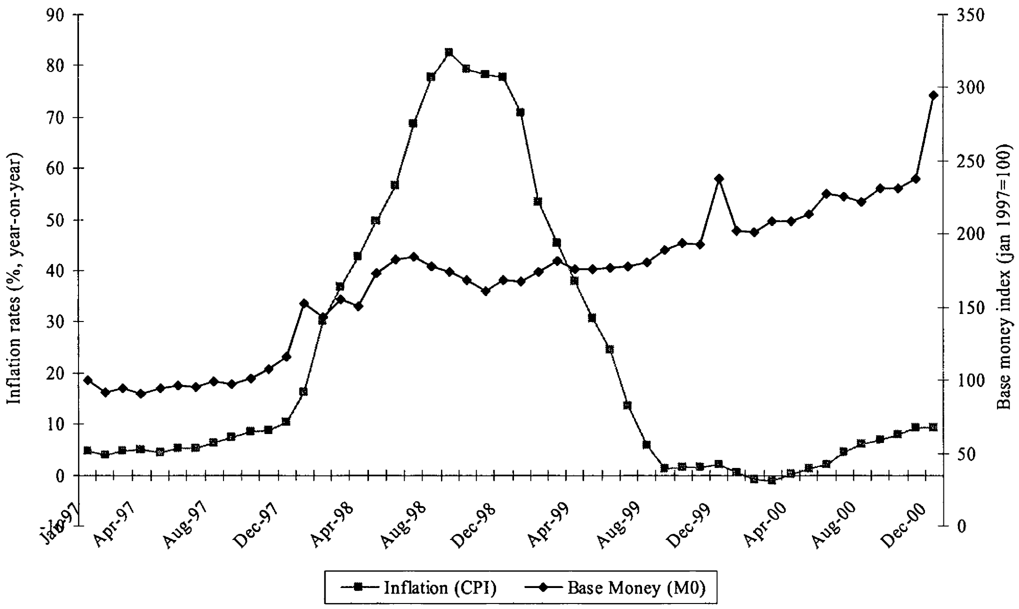
	1995/96	1996/97	1997/98	1998/99	1999/2000
Current Account	**-7.8**	**-5.0**	**4.1**	**5.8**	**8.0**
Exports	**50.2**	**56.3**	**50.4**	**51.2**	**65.4**
Non Oil and Gas	38.0	44.6	43.0	41.0	50.3
Oil and Gas	12.2	11.7	7.4	10.3	15.1
Imports	**44.2**	**46.2**	**31.9**	**30.6**	**40.4**
Non Oil and Gas	39.9	41.4	29.1	26.6	34.4
Oil and Gas	4.4	4.8	2.9	4.0	6.0
Trade Balance	**5.9**	**10.1**	**18.4**	**20.6**	**25.0**
Services	**-13.7**	**-15.1**	**-14.5**	**-14.9**	**-17.1**
Non Oil and Gas	-10.2	-10.5	-11.4	-11.7	-12.5
Oil and Gas	-3.5	-4.6	-2.9	-3.2	-4.6
Capital Account	**11.0**	**2.5**	**-3.9**	**-4.6**	**-6.8**
Official Capital					
Inflows	**5.7**	**7.6**	**13.7**	**9.4**	**7.5**
Official CGI	5.1	7.6	2.8	2.4	2.4
Non official CGI	0.6	0.0	10.9	7.0	5.1
Outflows (Debt Repayments)	**-6.2**	**-4.7**	**-3.8**	**-4.1**	**-4.3**
Private Capital					
Total	**11.5**	**-0.3**	**-13.8**	**-9.9**	**-10.0**
Direct Investment	6.2	4.7	-0.4	-2.7	-4.6
Others	5.3	-5.0	-13.5	-7.2	-5.4
Total (Capital plus current account)	**3.2**	**-2.5**	**0.2**	**1.2**	**1.2**

Source: Balance of Payment Statistics, BPS

Monetary and financial market indicators

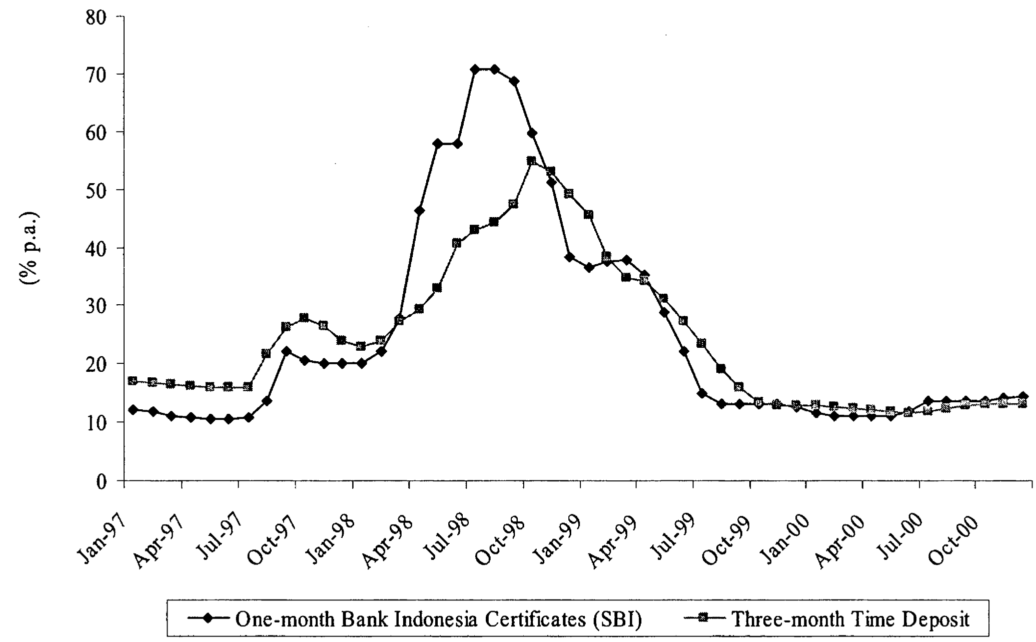
To get a picture of how severely the crisis affected monetary and financial indicators, it is useful to examine the trend of money supply, inflation and interest rates over the period 1997-2000. Money supply is represented by base money (M0), inflation is computed using the consumer price index (CPI) and the interest rates are represented by one-month Bank Indonesia Certificate (*SBI*) and the three-month time deposit. The trends are given in Figures 3.4 and 3.5.

Figure 3.4 Inflation and base money (M0), January 1997 – December 2000



Source: BPS and Bank Indonesia
Notes: Inflation (%, year-on-year), base money (M0) (index, 1997=100).

Figure 3.5 Interest rate, January 1997 – December 2000 (% p.a.)



Source: Bank Indonesia

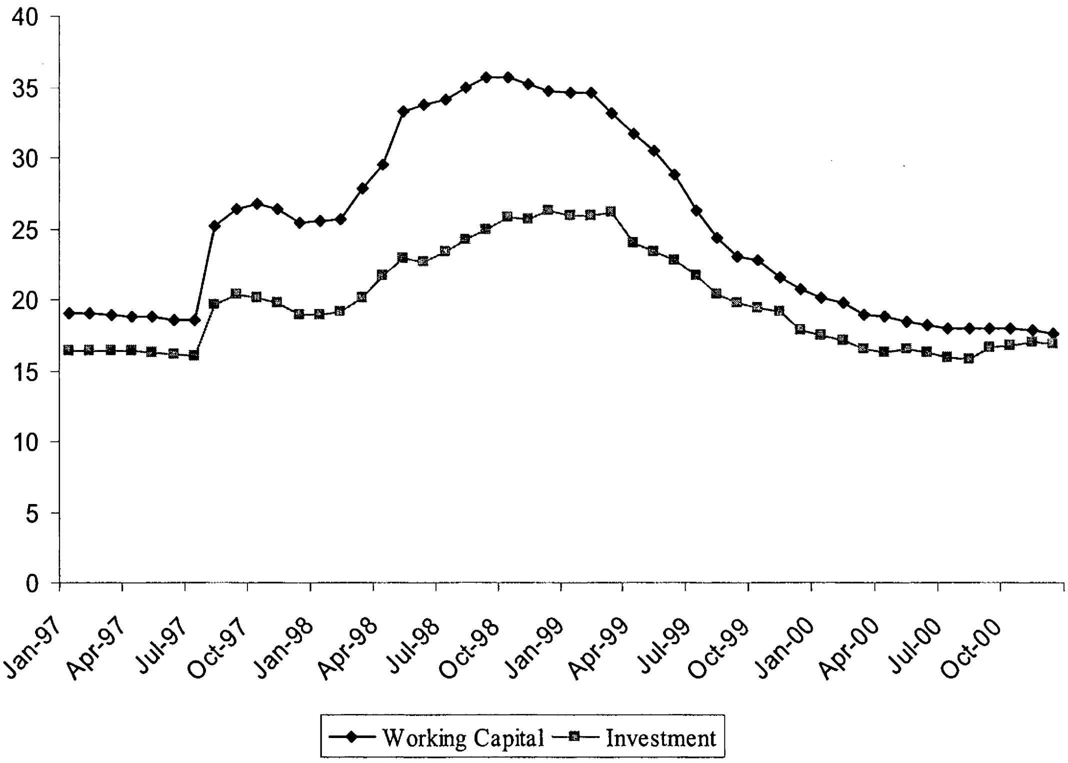
Money supply continued to increase from the onset of the crisis (Figure 3.4). The jumps in January and May 1998 were during a time of a mounting crisis of confidence characterised by bank runs. The runs forced BI to inject liquidity support to prevent the banking system from collapse. As a result, base money increased by about 60 per cent in the first six months of 1998. BI finally managed to control the base money growth from August.

Figure 3.4 shows that the impact of the crisis on inflation was dramatic. Inflation began to increase in the second half of 1997 when the crisis had just started, but it rose rapidly in since January 1998 and reached 82 per cent in September. A number of factors simultaneously contributed to the sudden increase. The sharp exchange rate increased the price of imported goods and the drought in early 1998 contributed to substantial increases in food prices. The excessive monetary expansion also contributed to high inflation. In fact, the figure shows that inflation moved closely with base money, albeit with a lag and it thus confirms the conventional inflation theory. In addition, panic buying in early 1998 was not limited to food but included other essential durable items. At the same time, a seasonal increase in demand further compounded the problem.

Interest rates increased substantially in September 1997 in response to the rapid exchange rate depreciation. The September one-month *SBI* rate doubled from about 11 per cent in July. Similarly, the three-month time deposit rates rose from 16 per cent in July to 26 per cent in September. The rates had been declining since then, but this was occurred the period of high inflation. As a result, real interest rates were negative, which consequently caused a strong disincentive to hold the Rupiah. *SBI* rates had been increased dramatically since September 1997 and reached a peak of about 71 per cent in July 1998. The rising trend was followed by a similar trend in time deposits although the increase was not as dramatic as that seen in *SBI* rates. Interest rates began to decline in September after BI regained control over the base money growth, and almost reached the pre-crisis level at the end of 1999.

The policy to maintain high interest rates in 1998 put strong pressure on the balance sheet of companies that were dependent on, or borrowed from, domestic banks because the cost of servicing debt increased dramatically during this year. Figure 3.6 shows that the average lending rates for working capitals in commercial banks increased dramatically from just below 20 per cent in mid 1997 to about 35 per cent in mid 1998.

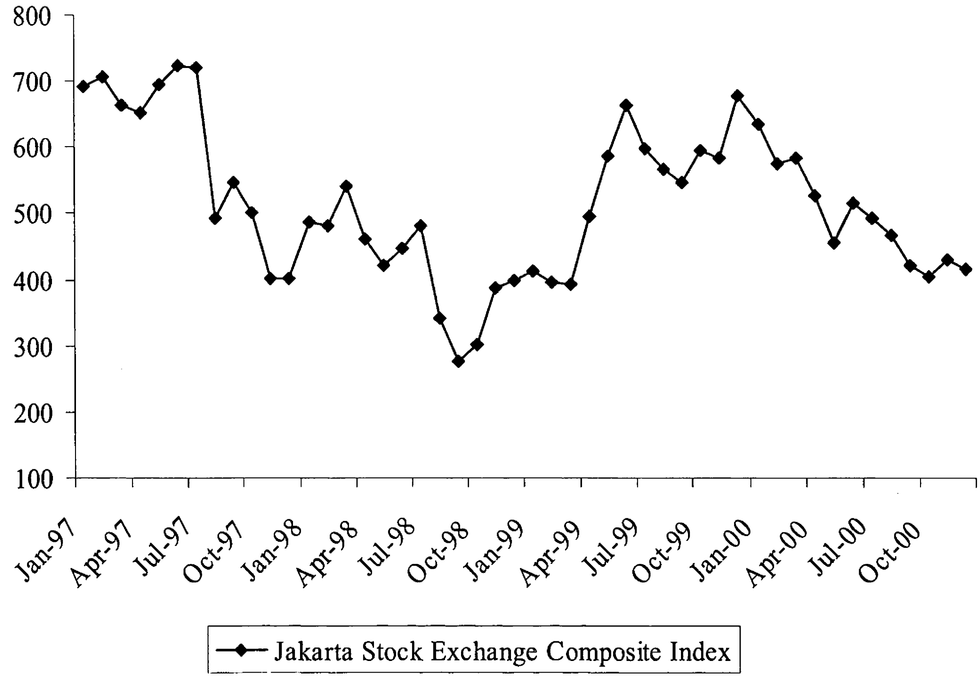
Figure 3.6 Average lending rates in commercial banks, January 1997 – December 2000



Source: Bank Indonesia

The high interest rate environment also severely affected the stock market. The Jakarta Stock Exchange Index fell by about 45 per cent from 720 in June to 400 in November 1997 (Figure 3.7). The index continued to fall, reaching its lowest level of 280 in September 1998. As with other indicators, the index began to recover from October onwards.

Figure 3.7 Jakarta Stock Exchange (JSX) Index, January 1997 – December 2000



Source: CEIC data base

Note: JSX Index, 1982=100

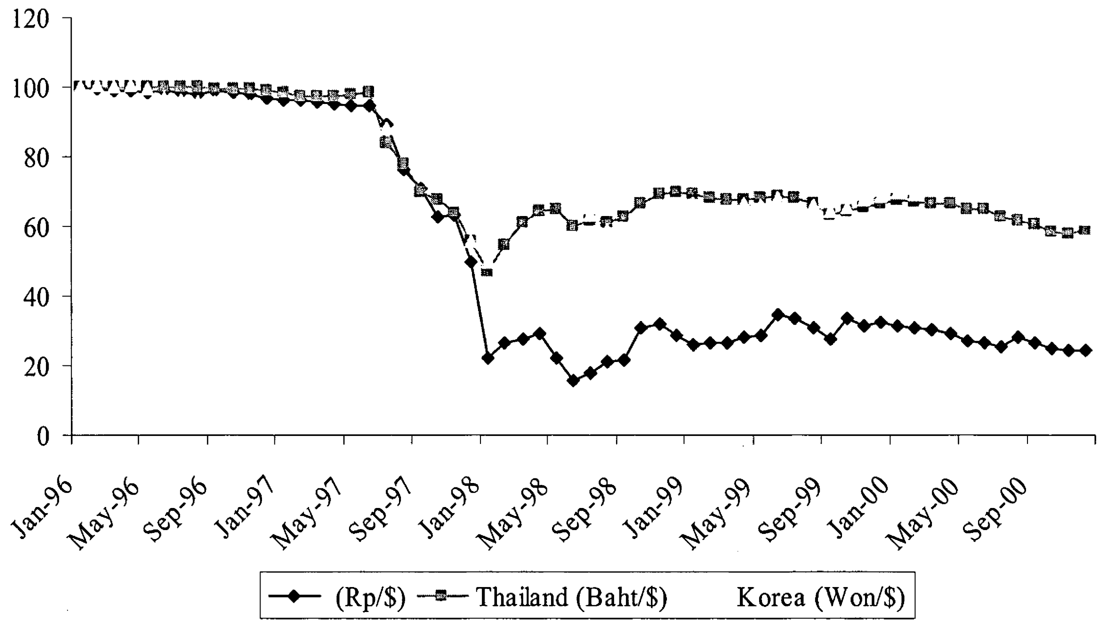
The crisis severely affected the exchange rate. By 1999, the exchange rate had lost about 70 per cent of its nominal value from 1996 (Table 3.4). The excessive monetary expansion in 1998 played a major role in this sharp depreciation. The nominal depreciation was translated into a sharp real depreciation in 1998 and hence boosted Indonesia's competitiveness. However, the improved competitiveness did not last long as the nominal appreciation took place in 1999 and 2000. It is important to note that the Rupiah's depreciation was comparable to the movement of currencies in other countries affected by the Asian crisis (Figure 3.8). But because of the mounting crisis of confidence and the excessive monetary expansion in 1998, the depreciation dramatically deviated from the common pattern observed in these other countries.

Table 3.4 Exchange rate indices

	1996	1997	1998	1999	2000
Nominal exchange rate index (1993=100)	89.0	70.8	21.2	26.8	24.5
Real effective exchange rate index (1993=100	126.0	114.4	57.2	81.8	76.0

Source : Bank Indonesia

Figure 3.8 Exchange rate movements of several crisis-affected countries (index, January 1996 = 100), January 1996 – December 2000



Source: CEIC data base

It is important to mention that the sharp exchange rate depreciation was likely to deepen the extent of financial difficulties faced by Indonesian companies who borrowed in foreign currency and sold their products on domestic markets. The core of the problem was the fact that most of the debts had short-term maturity profiles. According to de Koning (1998), most of the external debt of companies was in the form of bank loans with average maturity profile of about 18 months. Apart from the maturity level, the debt was also believed to be large and usually unhedged (Soesastro and Basri 1998). There was also uncertainty about the size of the debt. Soesastro and Basri indicated that the amount needed to service the debt in 1998, i.e. for paying both the principal and interest, could be as large as $59.8 million.

3.3.2 Trade policy

As described in Section 3.2, the first and second agreements with the IMF included reforms in the real sector. Although some analysts thought that these reforms were unnecessary, because the greatest problem was in the financial sectors (e.g. McLeod 1997), many believed they were needed to restore confidence. In this respect, the reforms need to be put in the more general context of trade reform in Indonesia. As noted in the previous chapter, there were rapid trade and investment reforms undertaken from the mid 1980s until the mid 1990s. From that time onwards, however, no major progress was undertaken before the crisis, given the framework for further trade liberalisation which was set in the May 1995 deregulation package. Indeed, a few years before the crisis, the World Bank urged Indonesia to reduce the tariffs of several sectors, which were untouched by the earlier reforms of the 1990s, into line with the overall program of tariff reduction (Soesastro and Basri 1998).

Significant trade reforms were undertaken as a result of the first two agreements with the IMF. The reforms aimed at reducing tariffs, promoting exports, and particularly NTBs. The latter largely captured The World Bank's proposal to continue the stalled trade reform in the early 1990s (Soesastro and Basri 2005). These reforms, particularly those related to the manufacturing sector, are briefly summarised below.

Tariffs

In the IMF agreement, Indonesia committed to gradually reduce tariffs on items subject to 15-25 per cent tariff rates prior to the crisis by 5 percentage points. The items included iron, steel and chemical products. Tariffs on these products were mostly reduced in 1999.

The reforms also substantially reduced trade protection in the automotive industry. Import tariffs on completely knocked down (CKD) and completely built up (CBU) vehicles were substantially reduced by the June 1999 automotive deregulation package. The tariff reductions, and the deregulation package in particular, were significant in regard to the protectionist policy aimed at supporting the National Car Program.

As a result of trade reforms in the mid 1990s, and the acceleration of the reform by the IMF agreements, the simple average tariff rates were reduced from 20 per cent in 1994 to 9.5 in 1998 and 7.5 in 2002 (WTO 1998, 2003).

Non-tariff barriers

The government removed many trade restrictions affecting import licenses, the local content schemes, trade monopolies and marketing arrangements. In 1998, it discontinued the tax, customs and credit privileges granted to the National Car program and local content scheme for dairy products. Through the automotive deregulation package in 1999, the government ended the local content scheme in the automotive industry and permitted general importers to import CBU vehicles. It also disbanded the clove marketing agency (BPPC) that held a monopoly over domestic marketing and the distribution of cloves. Finally it removed a number of restrictive formal and informal marketing arrangements, including those for cement, paper and plywood.

Other reforms related to NTBs included in the IMF agreements were aimed at reducing restrictions on exports. In the second IMF agreement, the government committed to gradually remove export taxes and eliminate all other types of export restrictions, such as quotas and provincial taxes levied on inter-provincial and inter-district trade. In addition, the government in 1998 reformed the export licensing system by removing many products from the regulated export lists and allowed cement producers to export with a general export licence.

To promote exports, the government granted export-oriented companies duty exemption and drawbacks. Eligible exporters operating in export processing zones or export-oriented manufacturing were eligible for tariff exemptions for all capital equipment, machinery and raw materials needed for initial investment and production. Exporters were also allowed to bypass import monopolies as long as the imported goods were used in export production.

3.4 Summary

The crisis in Indonesia, which began through a contagion effect from Thailand's economic turmoil, followed a similar path to that of neighbouring countries from August to December 1997. Indonesia's path, however, deviated significantly from late December 1997 because there was no confidence that the government would implement the necessary economic reforms. The situation worsened in 1998 with the onset of political trouble. The mounting crisis of confidence led to the exchange rate depreciation, bank runs and capital flight. As a result, the financial and banking sectors collapsed, which consequently led to the collapse of the real sector.

The crisis severely affected the Indonesian economy. It contracted by about 14 per cent in 1998. The manufacturing sector, which contributed to rapid economic growth in the 30 years leading up to the crisis, contracted by about 12 per cent. By 1999, the nominal exchange rate was only about 30 per cent of its value in 1996. Despite improvement in the country's competitiveness in 1998, export performance was disappointing. It only showed a positive response in 2000 when the overall economy began to recover. The crisis, through the IMF agreements, accelerated the process of reform in the trade regime, which had seemed to lose pace after 1995. The trade reforms during the crisis reduced tariffs and removed both regulations and NTBs, which were untouched by the pre-crisis reforms.

Chapter 4

Literature Review

4.1 Introduction

This chapter reviews the relevant literature to provide the framework for the empirical analyses in subsequent chapters. It begins with a discussion of the analytical approaches to examining the response of firms to the crisis, followed by a review of empirical studies.

4.2 Analytical approaches for examining firms' responses to the crisis

In contrast to wide-ranging studies debating the causes of the 1997/98 Asian crisis, there has only been a limited number of studies exploring the responses of firms to the crisis. Drawing on these studies and the general economic literature, this section discusses several alternative approaches to explaining firms' responses to the crisis.[1] It is important to note here that some arguments in the discussion are interrelated.

4.2.1 The role of aggregate shock

This approach comes from the crisis literature. It argues that the firms' responses during the crisis were largely determined by the aggregate shocks experienced by the crisis-affected countries. In the literature, two aggregate shocks have received large attention: shocks in the financial sector and the sharp exchange rate depreciation.

Shock in the financial sector

The importance of the shock in the financial sector is related to the theory of imperfection information in the capital market. In particular, two channels are often thought to have

[1] Claessens et al. (2000) provides a useful survey of some explanations put forward in the Asian crisis literature.

affected firms adversely: the balance sheet channel and the bank lending channel. The balance sheet channel is based on the view that the premium on external financing, i.e. the difference in cost between funds raised externally and funds generated internally, decreases with net worth (Jensen and Meckling 1976). It emphasises the potential depressing impact of the crisis on firms' collateralisable net worth, including the variables such as cash flow and liquid assets, which in turn increase firms' risk premium. A rise in interest rates, for example, directly weakens the firms' balance sheets by reducing the net cash flow of interest payments and by lowering the value of their collateral assets. Higher risk premiums imply a higher cost of borrowing or a lower ability to borrow, which will consequently result in lower capital investment and hence weaker performance. According to financial accelerator models, such as that of Bernanke and Gertler (1989), the decline in investment will amplify the increase in the premium, and hence reduce the investment even further.

The second channel is based on the assumption that banks play an intermediary role in channelling credit to an economy. The combination of macroeconomic management during the crisis (which often involved policies of high interest rates and tighter regulation on bank lending) and massive bank runs in some crisis-affected countries, can cause a deficiency in the capital of banks and therefore reduce the amount of available lending for firms. Such a reduction will curtail the amount of firms' investment and can impair performance.

In addition to these channels, after the crisis, banks had more difficulty differentiating between good and bad loan applicants. As a result, banks were likely to adopt more stringent lending policies favouring those who were able to provide more collateral assets or had a more established credit record. In other words, the degree to which credit was rationed, as a result of imperfections in the capital market (Stiglitz and Weiss 1981), should have been larger during and after the crisis.

The channels outlined above suggest a 'credit crunch' during the crisis. Here, credit crunch is defined as the situation where interest rates do not equilibrate supply and demand for credit and there is credit rationing (Gosh and Gosh 1999).

The impact of the crisis on firms through the channels described above, however, is unlikely to have equal impact across companies. The bank lending channels are likely to have adversely affected firms which were dependent on domestic banks. This, however, should particularly be the case for small and medium firms, because they tend to borrow from domestic banks. Based on a firm-level survey conducted by the World Bank in the countries affected by the crisis, Kawai et al. (2000) indeed found that large firms (mostly exporters and foreign companies) relied relatively more on debt-financing from international capital markets.[2] The balance sheet channel, which in principle has equal impact on all firms irrespective of their financial structure, is likely to have penalised highly leveraged firms more because they have to expend more to service debts.

The potential for credit rationing is thought to have been higher for small firms. As argued by Petersen and Rajan (1994), the amount of information that banks could acquire is usually much less in the case of small firms, because banks have little information about these firms' managerial capabilities and investment opportunities. Gertler and Gilchrist (1994) provide evidence for this, which shows that flows of credit into small firms in US manufacturing after tight money policy, and at the onset of recession, substantially contracted compared to the flows into large firms. The extent of credit rationing to small firms may also occur simply because they are not usually well-collaterised (Gertler and Gilchrist 1994).

Potential for credit rationing can also be expected to have been higher for young firms. Central to the proposition is that the risk associated with any loan varies with respect to the duration of relationships between firms and financial institutions (Diamond 1991). Rosen (1998) and Berger and Udell (1998) argue that financing patterns of firms may be related to their growth stages. In particular, Rosen suggested a non-monotonic relationship between age and proportion of internal finance. That is, the proportion increases for several years, declines and then is replaced by external finance.

Sharp exchange rate depreciation

The usual argument for the impact of exchange rate depreciation on firms relates to potential change in their competitiveness. For firms producing tradable goods, sharp exchange rate depreciation can benefit local firms by raising import prices. This causes consumers to substitute towards domestically-produced goods and, by lowering production costs relative to firms in other countries, provides cost advantages in export markets (Desai et al. 2004). The cost advantages are derived from the decline in the relative costs of labour faced by firms in the country depreciating its exchange rate (Forbes 2002a). Several studies, in particular Forbes (2002a, 2002b), provide evidence that exchange rate depreciation improves the performance of firms that produce tradables. More generally, Ghei and Pritchett (1999)

[2] Similar characteristics were also evident for firms in Mexico (Krueger and Tornell 1999).

summarise the empirical evidence on the impact of exchange rate depreciations on exports, and conclude that exchange rate depreciations mostly translated to an improved export performance.

Despite this evidence, some factors might mitigate the impact of improvement in competitiveness. The first is competitive depreciation, which means that the expansionary effect of exchange rate depreciation in a country (through exports) may not materialise if the trade competitors of the country also undertake similar depreciation.[3] The second is a period of high inflation during the crisis, which limits the extent to which the nominal exchange rate depreciation translates into a real depreciation.

The third factor is firms' production structure. As shown in the theoretical framework developed by Forbes (2002a), the short-run benefit of exchange rate depreciation on a firm's production costs (i.e. lowered relative labour costs) depends on the share of imported input used in production. If the share is large, exchange rate depreciation increases the costs of capital and thereby weakens the positive impact of lower production costs from the cheaper labour.

The last factor involves exchange rate depreciation and firms' financial constraints, working through the balance sheet channel. If a large share of firm debt is denominated in foreign currency, exchange rate depreciation may diminish their net worth by inflating the domestic-currency value of the debt, and hence lowering the firms' ability to increase investment. The negative impact of the depreciation on the firms' financial constraints, however, is less likely to affect export-oriented companies, since there is a better match between foreign-currency revenue and foreign-currency debt.[4]

Exchange rate depreciation increases firms' incentive to export. Whether the advantage can be captured, however, depends on some other factors. Literature on exporting suggests that firm efficiency is one such factor. The argument, which is often termed as the 'self-selection hypothesis', is based on the notion that export markets are far more competitive than domestic firms, which allow only the most productive firms to survive (Aw and Hwang,

[3] Competitive depreciation has long been recognised as a major constraint on export expansion (Gupta et al. 2003).

[4] For Mexican firms in the 1990s, this was in fact the case. Firms which borrowed abroad were largely exporters (Aguiar 2005; Krueger and Tornell 1999). A similar characteristic was also evident for firms in the South East Asian countries. The World Bank's firm-level survey in 1998 revealed that firms in these countries which borrowed abroad were mostly exporters, foreign and large firms (Kawai et al. 2000).

1995). Many empirical studies have established support for this hypothesis. In particular, productivity (as measured either by total factor productivity or labour productivity) is found to be significantly different between exporters and non-exporters (e.g. Bernard and Jensen 1999).

Differences between exporters and non-exporters, however, are not only limited to productivity. Several other studies have also found significant differences in terms of the other characteristics, including size, ownership and capital intensity. While many of these differences can be attributed to efficiency, they also reflect the significance of other factors in explaining firms' export behaviour. One of these factors, which received large attention in the literature, is differences in sunk-costs for entering export markets. The underlying assumption is that non-exporters must incur large sunk costs in entering export markets. Recent studies have confirmed the sunk-cost hypothesis empirically. Roberts and Tybout (1997), for example, found that firms' previous export status is an important determinant of the decision to export.

The discussion above suggests that, assuming that competitiveness did improve during and after the crisis, the success of firms in responding to the situation is likely to vary. Firms in labour- and resource-intensive industries could have been more successful since they gain more from a relatively cheaper cost of production. Similarly, firms with low capital intensity could have been more successful than others even in the same industry because the capital intensity across firms could vary substantially within an industry. Export-oriented firms are likely to have been more responsive in increasing their exports. This is because they did not need to incur all the necessary costs required to penetrate export markets. The domestic-oriented firms, in contrast, needed to pay all of the necessary costs which, as explained, are large and sunk in nature.

While domestic-oriented firms can be expected to be unresponsive to the crisis, particularly in terms of export, some studies drawing on Latin America's crisis (e.g. Blomstrom and Lipsey 1993) indicate that these firms may have successfully increased their exports. The variables which could increase the firms' ability to compete in export markets and reduce the extent of sunk exporting costs are likely to be the key determinants. These variables, along with their hypotheses, are discussed in more detailed in Chapter 9.

4.2.2 Characteristics of firms

Several studies have suggested that the diversity at firms' performance can be explained by heterogeneity in the characteristics of companies. Dwor-Frecaut et al. (2000), for example, indicate a systematic performance difference across firms with different sales orientation and leverage.

Emphasising the role of firm characteristics has become an increasingly important consideration in the empirical studies examining performance of firms. In his review of the recent empirical studies on this subject, Geroski (1998) observes that size seems to be an important characteristic associated with systematic differences in firm performance. Based on this observation, he further argues that understanding and identifying the source of firm heterogeneities is a key to making some progress in explaining heterogeneity in their performance.

Justification for this approach can also be derived from the resource-based theory of firms. According to this theory, the differences observed in firms' performance can be explained by some specific factors attached to the firms (e.g. Rumel 1984; Barney 1991). There is no clear definition, however, about which resources constitute the firm-specific resources. Nevertheless, as argued by Barney (1991), these resources can be defined to include all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc that are controlled by firms. Dierickx and Cool (1989) argue that the most important element of these resources is that they are not available in the market but must be developed by firms.

If heterogeneity in firm characteristics matters in explaining their responses to the crisis, the question is what are the sources of this heterogeneity? The discussion so far indirectly suggests some of these sources, namely financial structure and characteristics, sales orientation and production characteristics. Literature on firm performance indicates that some other sources may also have been important. The following discusses the reasons why these other sources, namely size, age and ownership, might have been important.

a. Size

The argument traditionally put forward in the literature for the importance of size is related to scale economies in production. If economies of scale in production exist, large firms may outperform small ones in a low demand situation by setting lower prices.

However, this argument is not supported by evidence in the empirical literature, which revealed mixed findings on the relationship between economies of scale and firms' performance. Berry (1992, p.56) concluded that "... the generally positive relationship between profits and size observed in US corporations does not seem to characterise LDC plants." He further argued that: "Even were such a link to show up, it would not necessarily reflect technical economies of scale. Since most large firms are multi-product, and since in many industries technologies change rapidly. "

As also noted in Berry (1992), the literature provides several reasons for the presence of a size-performance relationship that does not arise from economies of scale. First, large firms tend to perform better than small ones because they often have better management. Large firms are filled with more capable people (workers and managers), train their employees more thoroughly and are able to afford specialist advice (Geroski 1998). Second, the good performance of large firms might also be a result of the market power they posseses. In fact, this is one of the typical empirical findings in the industrial organisation literature within the Structure-Conduct-and-Performance framework (Porter 1974; Shepherd 1972).

Nevertheless, the modern theory of the firm provides two arguments which might offset some advantages at large firms. The existence of transaction costs (Williamson 1985) gives rise to the importance of organisational structure in affecting firm performance. Transaction costs in practice are associated with planning and task monitoring. Large firms characterised by large management and administrative layers are associated with high transaction costs, implying a complex organisational structure. The complexity in turn, can reduce ability of the firms to quickly respond to changes in the business environment. Among others, Tornatzky and Fleischer (1990) and Utterback (1994) show that small firms exhibit greater responsiveness in adapting to changes in the business environment, because of their leaner organisational structure. Further, to some extent small firms are family-based, and this characteristic greatly reduces transaction costs and contributes to an even leaner organisational structure.

The second argument is related to the managerial discretion hypothesis (Grossman and Hart 1982) which emphasises the agency problem arising from the misalignment in interests between managers and shareholders. When ownership and control are separated, firm managers enjoy greater discretion in the decision-making process. Firms in which ownership and control is separated, likely in the case of large firms, often have difficulty monitoring the activities of managers, who may sacrifice company objectives for their own short-term gains.

In addition to these arguments, some other reasons might also have contributed to small firms having an advantage during the crisis. First, they tend to focuses on niche markets which avoid potentially higher competition from large firms. This argument is based on the theory of strategic market choice (Caves and Porter 1977; Porter 1979) which posits small firms strategically and deliberately occupy a market niche to avoid direct competition with larger ones. Second, small firms are usually less connected to the financial sectors and more likely to self-finance. Hence, they are unlikely to suffer from the tightening credit market and rising debt burden during the crisis.

b. Age

The significance of a firm's age lies in the differences in managerial experience available to it. Greater experience would have provided older firms with more strategic options to deal with the effects of the crisis. The emphasis on experience can be derived from theoretical models explaining growth of firms, such as Jovanovic (1982) which postulates that over time firms 'learn' about and improve their efficiency. Supporting this argument, a sizeable amount of empirical research on firm dynamics has developed the stylised fact that the probability of firm survival increases with their age.[5]

Although differences in experience might explain the importance of age, much of the explanation can also be attributed to the stylised fact that many large firms are older. Consequently, the advantages and disadvantages of a firm being large, as outlined in the previous sub-section, may also be relevant in explaining the importance of age in shaping the responses of firms during the crisis.[6]

c. Ownership

There are several aspects of firms' ownership which might be important for in their responses to the crisis. This study focuses only on ownership by the source of investment (foreign, government or private domestic), because of data limitations.

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[5] Sutton (1997) and Caves (1998) provide excellent theoretical and empirical reviews of the subject.

[6] In comparing the growth rates between small and larger firms of UK companies over the period 1975-85, Dunne and Hughes (1994) found that variation of the growth rates are larger for the group of small firms. The variation, however, was reduced substantially after the comparison controlled for age of the firms.

Foreign ownership

There are several reasons why foreign firms might have responded better to the crisis than domestic firms. First, foreign firms have better access to international sources of capital which allows them to overcome potential financial difficulties during the crisis (Blalock and Gertler 2005; Desai et al. 2004). Second, foreign firms were likely to take advantage of the sharp exchange rate depreciation during the crisis (i.e. by increasing their exports), since they have the advantage of being part of a global economy network (Globerman et al. 1994) and many foreign firms in Asia, and in the crisis-affected countries in particular, were in fact exporters (e.g. Athukorala et al. 1995; Urata 1998; Ramstetter 1999, 2002; Kawai et al. 2000). This prior export experience provides the firms with lower costs of export expansion, relative to those faced by domestic firms.

There are at least two factors, however, which might have mitigated the superiority of the foreign firms. The first is the degree of foreign control in them. As shown by Ramstetter (1999) for Indonesia, the extent of competitiveness in firms with some foreign ownership varies depending on the foreign shares in them. He attributed this to the possibility that the parent companies may restrict the flow of firm-specific assets, such as technology and international marketing networks, to their uncontrolled affiliates. The other factor is the financial structure of the firms. The response of foreign firms might have been depressed by the burden of servicing their debt, since their debt structure is most likely dominated by foreign-currency debt (Blalock and Gertler 2005). As noted, however, this argument is more applicable to domestically-oriented foreign firms, as the export-oriented foreign firms are able to match their foreign-currency denominated debt with foreign-currency revenue.

State ownership

State-owned enterprises (SOE) might have performed better than other firms during the crisis, because that they are probably more likely to be bailed out by the government. Underlying this argument is the fundamental difference of the objective function between private and public firms. While the objective for the former is to maximize profit, the latter's is to maximize multiple variables, many of which involve social objectives (Laffont and Tirole 1993). In many cases, the most important objective is related to employment.

The capacity of the Indonesian government to support SOEs, however, was very limited during the crisis. As in the other crisis-affected countries, government revenue fell substantially during this time, while fiscal deficit rose.

Given this fiscal constraint, there is a chance that SOEs may have responded successfully to the crisis. This prediction is based on the managerial discretion hypothesis of agency theory (Grossman and Hart 1982). The increase in financial pressure and bankruptcy risk due to a weakened government's support can lead to a reduction in organisational slack caused by the agency problem between the SOE's managers and the owner (i.e. government). As a result, this can lead to actions by the managers aimed at improving efficiency, and hence performance. Recent studies of developing countries have confirmed this kind of behaviour empirically. Bertero and Rondi (2000, 2002) found that the tightened government support for Italian public firms from the late 1980s forced these firms to respond positively, by increasing productivity and investment, and reducing employment.

4.2.3 Firms' strategic responses and the impact of greater competition

Apart from the two approaches discussed above, there are two other alternative views which might be useful for explaining firms' responses to the crisis. We discuss these in turn.

Firms' strategic responses

The crisis was characterised by a massive decline in consumer demand, implying that firms faced greater product market competition during the crisis. In such an environment, strategic responses by firms might have been crucial in determining the success of firms in coping with the crisis.

According to Porter (1980), there are three generic strategies firms can adopt in an environment with high competition. These are cost leadership, product differentiation and focusing on a niche market. Cost leadership refers to a set of policies aimed at reducing costs, including tight cost and overhead control, construction of efficient-scale facilities and cost minimisation in areas such as marketing and advertising. This strategy emphasises a large role for managerial attention to help firms undertake these policies. In contrast, product differentiation refers to a strategy which creates a unique product for the firms. This strategy emphasises action to segment the markets or to customise the products. Finally, focusing on a niche market is a strategy to focus on a group of customers or some particular markets. This strategy can be likened to product differentiation as it may involve some customisation of products.

To the author's knowledge, there is no empirical study in the context of the Asian crisis which examined firm responses within Porter's framework. Nevertheless, the study by Geroski and Gregg (1997) in the context of the 1990s UK recession provides few insights into the implementation of these strategies. Based on a firm-level survey of about 2500 firms in the country - and the question of how they responded to the recession - they found that firms adopted several strategies simultaneously in responding to the recession. These strategies can be broadly grouped as financial decisions (such as debt rescheduling and assets disposal), strategic decisions (such as a change in marketing strategies and focusing on core business) and cost control (such as reducing employment and closing down plants). In addition, Geroski and Gregg found that firms mostly concentrated on strategies for controlling costs, particularly those companies which were severely affected by the recession.

Another important aspect regarding the firms' strategic response is the adjustment in their labour demand. The basic hypothesis is that firms tend to hoard labour in the event of negative shocks. Labour hoarding here is defined in a specific way following Oi (1962), which argues that labour can be considered as a quasi-fixed factor of production arising from training activities that create firm-specific human capital in their employees. When there is a decline in their output demand, firms retain some of their employees to preserve the human capital.

Whether or not firms hoard labour, however, depends on the adjustment in the labour market. In particular, it requires real wages to be flexible. For Asian countries, this is likely to be the case, as labour markets in these countries generally adjust quickly to changes in economic conditions (Manning 1998). As shown by their experience during the stages of developments, wages were closely tied to productivity and adjusted in response to fluctuation in demand (Fields 1994).

The extent of labour hoarding is also likely to vary between firms. As noted, this is because the underlying source of labour hoarding is the firms' investment in their employees. Thus, firms with a high degree of mechanisation, or in capital-intensive industries which require skilled labour, are more likely to hoard labour.

The impact of greater competition

The success of firms in responding to the crisis may have depended on the level of competition in product markets. The industrial organisation literature outlines two rationales for this. The first is that a low level of competition is often associated with high managerial slack introduced by high monopoly rent. Theoretical models, such as those of Hart (1983) and Leibenstein (1975), posit that the increase in the number of players in a market decreases the potential for managers to deviate from firms' profit-maximising objectives. Schmidt's (1997) theoretical model posits that high managerial slack arising from low levels of competition lowers the firms' efficiency and thereby raises the probability of bankruptcy.

The other rationale is derived from theories on the relationship between collusive behaviour and business cycles. Two competing hypotheses are offered by these theories. First, low demand, or a demand shock, alters the optimal behaviour of oligopolies from collusive behaviour to more perfectly-competitive outcomes. In the Green and Porter (1984) model, collusive behaviour reverts to the Cournot outcome if price falls below the agreed "trigger price" level, leaving the optimal collusive outcome unsustainable. Slade (1989) provides a model that, in the presence of demand shock, price-cutting action is triggered and leads the equilibrium towards the Bertrand outcome, which is identical to the competitive market outcome. The second hypothesis, in contrast, predicts that the likelihood of collusion breaking down is small when demand is low. This hypothesis is put forward by theoretical models such as those of Rotemberg and Saloner (1986) and Rotemberg and Woodford (1992). The firm that lowers its price relative to another is not likely to capture a large portion of the market since the market price has already been lowered. Meanwhile, punishment from the deviation could be large if the demand resumes to its normal state. The benefit from deviating may be exceeded by its costs.

4.3 Review of empirical studies

As noted, empirical studies examining the response of firms to the crisis are scarce and, moreover, they are sporadic in terms of the issues and countries covered. Perhaps this is because such studies require detailed information at firm level, which is sometimes difficult to obtain. Despite this scarcity, there are few studies available in the literature. Examples include Dwor-Frecaut et al. (2000), Forbes (2002a, 2002b), Claessens et al. (2000) and Desai et al. (2004).[7] This section reviews these studies to gain some insights into several related issues. To organise the discussion, the review is divided into four sub-sections based on the major issues to be extracted from the studies.

[7] Dwor-Frecaut et al. (2000) reported the findings from the World Bank's firm level survey of some 3700 firms in five crisis-affected countries which covers the peak of the crisis period (from early 1998 to early 1999). Despite its limitations, this study is the most comprehensive empirical study on this subject.

4.3.1 The nature of the previous empirical studies

Previous empirical studies on the subject usually use samples which only include firms or plants that survived the crisis. Methodologically, this assumes that there were no systematic forces governing the disappearance of some firms or plants during and after the crisis. This assumption, however, is not very realistic. As indicated by some studies, there were many firms that experienced severe financial difficulties during the crisis, which may have led to bankruptcy. Moreover, with such a deep economic contraction, many firms faced cash-flow problems. Thus, focusing only on those that survived the crisis may potentially lead to what is commonly known as 'survival' bias. Indeed, Dwor-Frecaut et al. (2000, p.3) noted that the World Bank's study suffered from this bias.

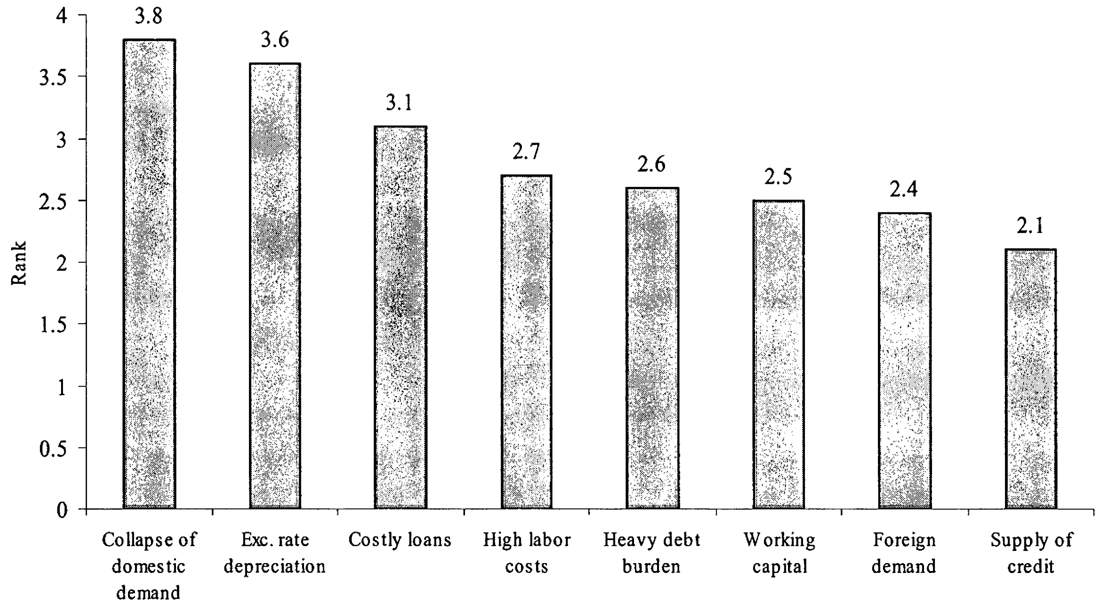
Another important aspect of these studies is that to date there has been no study which focuses on the response of firm entry during the crisis. This subject is important because many factors governing entry might have changed during and after the turnmoil. Highlighting this, the World Bank firm-level survey revealed that about five per cent of exporters in Indonesian manufacturing were new entrants during the crisis (Bappenas 2000).

For Indonesia, it is worth noting that most of the other studies concentrate on an aggregate picture of the responses. Examples include Thee (2000), Fukuchi (2000) and Azis (2000) which appeared in the December 2000 issue of *The Developing Economies* dedicated to the impact of the crisis on Indonesian manufacturing. Thee shows how deep the crisis affected the sector in terms of several major indicators, such as output, employment, capacity utilisation and number of firms. In addition, he also shows that the crisis affected industries unevenly.

4.3.2 Determinants of the firms' responses to the crisis

Several studies suggest the importance of aggregate shocks in shaping the firms' responses. The World Bank's firm-level survey, reported in Dwor-Frecaut et al. (2000), asks respondents a qualitative question to rank the perceived causes in the decline of their performance during the crisis. The responses are reproduced in Table 4.1 and Figure 4.1. They indicate that, in order of decreasing importance, declining domestic demand, high imported input costs caused by exchange rate depreciation, costly loans stemming from high interest rates and labour costs are the major perceived causes of the decline in the respondents' performance during the peak of the crisis. Contrary to conventional wisdom, the decline in availability of credit, which partly reflects the alleged credit-crunch, was not considered a major cause of firms' weak performance in the period.

Figure 4.1 Source of output decline of firms in the crisis affected countries



Source: Dwor-Frecaut et al. (2000)
Note: The crisis affected countries are Thailand, Indonesia, Korea, the Philippines and Malaysia

Table 4.1 Rank for the source of output decline during the crisis in the crisis affected countries

Table 4.1 continued

Country	The source of decline			
	Collapse of domestic demand	Exchange rate depreciation	Costly loans	High labor costs
Indonesia	3.5	3.6	3.1	2.6
Korea	4.3	2.9	3.1	2.0
Malaysia	4.0	3.6	2.8	2.5
Philippines	3.2	3.9	3.4	3.3
Thailand	4.0	4.0	3.3	3.4

Table 4.1 concluded

Country	The source of decline			
	Heavy debt burden	Working capital	Foreign demand	Supply of credit
Indonesia	-	2.1	1.8	1.8
Korea	2.3	2.6	2.8	2.1
Malaysia	2.5	2.3	2.4	2.1
Philippines	-	2.7	2.4	2.3
Thailand	2.9	2.7	2.8	2.4

Source: Adapted from Table 1.3 in Dwor-Frecaut et al. (2000).
Note: 1= not important, 5=important

The low response to the issue of credit availability questions the validity of the credit- crunch argument as one of the sources for firms' weak performance during the crisis. One possible explanation for the hypothesis was that the result reflected the reduction in demand for credit, instead of reduction in the supply of credit. Gosh and Gosh (1999) attempted to shed some light on this issue. Estimating the supply of, and demand for, credit in Indonesia, Korea and Thailand from 1992 to 1998, they concluded that, while the supply of credit to the real sector declined, the estimated demand for credit fell even more sharply (Gosh and Gosh 1999, p.19). They demonstrated that, for Indonesia and Korea, the estimated supply of credit declined at the beginning of the crisis (i.e. during the last few months of 1997) but the estimated demand for credit contracted substantially at its peak (i.e. 1998). Ding et al. (1998) reach a similar conclusion to that of Gosh and Gosh, drawing on some aggregate banking financial indicators. Their results provide no indication of whether there was a decline in demand for credit. Nevertheless, these studies did not provide a clear indication about whether there was credit rationing. As explained, credit rationing is another important element of credit crunch, apart from curtailment in credit supply. Nevertheless, both studies argue that credit rationing was likely during the crisis and affected small and medium firms more adversely than large ones.

Forbes (2002a) examines the impact of exchange rate depreciation on firms in some 'crisis' countries, as well as on firms in the rest of the world, for the major devaluation events between 1997 and 2000. She found that, immediately after the devaluation, firms in the crisis countries recorded superior performance over those in the rest of the world, in terms of growth and profitability. She also found that the impact of the devaluation depended on the capital-to-labour ratio and changes in costs of capital, although the capital-costs change occurred within the context of the long-run impact of the devaluation.

As reviewed above, although considering the aggregate shocks is helpful in explaining the general pattern of firm responses, it ignores the significant differences across industries and companies. As indicated by some researchers (e.g. Claessens et al. 2000; Forbes 2002b), such differences might be more important than the effect of exogenous shocks for explaining firm responses. Taking this view on board, some other studies have focused on the idea that differences in characteristics may have mattered in explaining the responses.

The World Bank's study (i.e. Dwor-Frecaut et al. 2000) indicates that heterogeneity did matter. This is shown in Table 4.2, which tabulates the number of firms in the sample that expanded in 1998, relative to their position in 1997. As shown in the table, the number of expanding firms differed significantly between groups of firms distinguished by three characteristics, namely size, sales orientation and foreign ownership. The pattern of these differences was robust as they persisted across the countries. Apart from demonstrating the importance of the characteristics of firms, Table 4.2 also suggests the importance of some industry characteristics. The number of expanding firms evidently varies considerably across industrial sectors. The pattern also varies considerably across countries, perhaps reflecting differences in industrial structure.

Table 4.2 Characteristics of the firms that expanded in 1998 relative to the end of 1997

Table 4.2 continued

	Percentage of firms that expanded					
	By size		By sales orientation		Foreign ownership	
	Small	Large	Non-exporters	Exporters	Non-foreign firms	Foreign firms
Indonesia	43.1	56.9	40.1	59.6	79.4	20.6
Korea	70.1	29.1	21.9	78.1	81.9	18.1
Malaysia	65.1	34.9	39.3	60.7	68.5	31.5
Philippines	43.9	56.3	33.8	66.2	59.8	40.2
Thailand	56.0	44.0	25.9	74.1	67.0	33.0
Total	57.9	42.1	30.8	59.2	71.2	28.8

Table 4.2 concluded

	Percentage of firms that expanded					The expanded firms	
	Industry						
	Food	Textiles and Garment	Electrical machinery	Chemical	Auto	Number of firms	Percent of the total sample
Indonesia	47.6	7.9	17.5	26.9	-	51.0	6.3
Korea	-	31.4	25.0	32.4	1.0	103.0	12.0
Malaysia	31.5	19.1	20.2	27.0	2.3	86.0	10.6
Philippines	25.6	40.2	19.5	14.1	-	71.0	12.6
Thailand	12.1	66.4	12.9	-	8.6	100.0	15.2
Total	20.4	36.3	21.3	19.1	2.9	411.0	56.7

Source: Adapted from Table 1.3 in Dwor-Frecaut et al. (2000).

Note: The expansion or contraction is measured based on the change in capacity utilisation

Building on the framework from her earlier study (i.e. Forbes 2002a) and using a larger dataset, Forbes (2002b) examined which characteristics of firms determined the impact of an exchange rate depreciation on their performance. She found that the most important characteristic was sales orientation. Firms with greater sales orientation had significantly better performance after the exchange rate depreciations. The result is robust in respect to alternative measures of performance. She also found that firms with higher debt ratios and larger size tended to have weak performance after the depreciation, although the significance and consistency of these results varied across the alternative performance measures and model specification.

Claessens et al. (2000) underline firms' financial structure as an important determinant of their performance during the crisis. After estimating the regression equations relating to firms' profit-margins in 1998 to various variables representing aggregate shocks, financial and non-financial characteristics of firms in 1996 for a sample in Indonesia, Korea, Malaysia, Hong Kong and Singapore, they found that firms with high leverage and higher proportion of short-term debt tended to perform weakly compared to those without these characteristics. They attributed this finding to the weak and vulnerable financial structure of firms in Asian countries before the crisis.

In contrast to Forbes (2002b), Claessens et al. found that larger firms tended to have been better able to weather the crisis than smaller ones. The coefficients of variables representing size were positive across the specifications. The coefficients, however, showed only a low degree of confidence, since they were not statistically significant.

Several studies demonstrated that foreign-owned firms responded better than domestic firms during the crisis. But more importantly, these studies indicated that the superior performance of the foreign firms can be attributed to their ability to seek financial support from their international-linked sources. Desai et al. (2004), in examining the performance of US multinationals relative to that of local firms in countries which experienced large exchange rate depreciations in 1990s, demonstrated that the leverage of local firms increased significantly in the first two years after the depreciations, while the leverage of the multinationals did not. Using a similar approach but focusing on the investment response of exporters in Indonesian manufacturing, Blalock and Gertler (1995) showed that while all exporters increased their value added and employment after the crisis, only those with foreign ownership increased investment, implying that these firms were not financially constrained.

A similar conclusion is reached by Fukao (2001) and Urata (2002). They found Japanese parent companies supported their "suffering" affiliates in the crisis affected countries. That support was not only limited to financial assistance. Parent companies continued to transfer firm-specific assets and investing in their affiliates over this period. More importantly, they also helped domestically-oriented affiliates (pre-crisis) to redirect their sales to foreign markets.

In addition to showing the importance of foreign ownership, Blalock and Gertler (2005) found significant differences in the value added and employment responses between exporters and non-exporters. In particular, they found that domestic exporters in Indonesian manufacturing increased value added and employment by 20 and 12 per cent, respectively, relative to those who did not export. A similar pattern was also evident in Thailand. Dollar and Driemeier (1998) found that foreign firms in Thailand which survived the crisis had a higher export to sales ratio than independent local firms.

4.3.3 Adjustment in labour employment

The World Bank study (i.e. Dwor-Frecaut et al. 2000) indicates that some firms were hoarding labour during the crisis. First, for firms in Indonesia and Thailand, a significant number of them were found to have maintained their employment level despite the decline in their capacity utilisation. Second, job destruction was concentrated in production rather than in managerial jobs. The destruction in production jobs accounted for about 75 per cent of the total job destruction, and was most severe in Thailand and Malaysia.

The study also found that young workers, who can be considered as those with very low firm-specific human capital, were severely affected by the crisis. For Indonesia, Thailand and Malaysia, about 70 per cent of those who left firms were workers in the age group of 20-30.

As noted, labour hoarding will be optimal if, among other factors, real wages decline. Given the very limited studies on this issue, Manning (2000) shows real wages in Indonesia indeed declined dramatically during the crisis and more than the other crisis affected countries. That is, they fell by about 35 per cent in 1998 for the whole economy and nearly 40 per cent in manufacturing.

4.3.4 Export supply response to the crisis

As discussed, exchange rate depreciation is expected to improve export performance of the countries affected by the crisis. However, several studies (e.g. World Bank 2000; Duttagupta and Spilimbergo 2004) have demonstrated that the evidence conflicted with this prediction.

As shown in Table 4.3, export growth in terms of the value of all crisis-affected countries contracted adversely in 1998, ranging from 4 per cent in Indonesia to nearly 16 per cent in the Philippines. This sluggish export supply response played a role in prolonging the crisis in these countries, and more importantly, is puzzling from an analytical point of view (Duttagupta and Spilimbergo 2004).

Several possible explanations for the sluggish export response have been popularised in the Asian crisis literature. The most common is the decline in demand for exports during the few years before the crisis. Reflecting this, Table 4.3 shows the substantial decline in export growth in 1996 and 1997 across all countries affected by the crisis. Decomposing the source of export growth in the period 1995-96, the ADB (2002) revealed that 86 per cent of decline can be attributed to a weakening export demand. Several factors underlie the weakened demand. First, these countries specialised in trading among themselves. According to World Bank (2000), intra-regional exports accounted for about 40 per cent of East Asia's total exports. Therefore, when a region-wide export shock hits, as occurred in 1995 and 1996, these countries are likely to experience some decline in their exports because they are not able to diversify their exports to other markets. In addition to the high trade intensity within the region, many product sectors in which these countries specialised, such as textiles, garments and footwear, experienced a slump in 1995 and 1996 (World Bank 2000; ADB 2002). Finally, the depreciation of the Japanese yen against the US dollar contributed to lower price-competitiveness of these countries' exports, since their currencies were effectively pegged to the US dollar. The effect of weakened export demand was mostly manifested through the decline in prices, instead of volume. According to the ADB (2002), about two-thirds of the decline in export value (in US dollars) was due to a decline in export prices (also in US dollar terms).

Table 4.3 Trends in export of East Asian countries, 1991-98

a. By export value

Country	Growth (%)					
	1991-95	1996-98	1995	1996	1997	1998
Indonesia	12.3	2.9	14.3	10.4	2.4	-4.1
Malaysia	20.7	0.6	25.8	9.6	1.6	-9.3
Thailand	19.3	-1.9	25.3	1.5	1.6	-8.9
Philippines	17.4	3.0	24.3	15.5	9.1	-15.7
Korea	15.2	2.2	31.6	4.0	7.5	-5.0
World	8.2	2.3	18.6	5.0	3.9	-1.9

b. By export volume

Country	Growth (%)					
	1991-95	1996-98	1995	1996	1997	1998
Indonesia	11.1	6.2	7.9	8.2	7.8	2.5
Malaysia	15.5	6.7	17.6	7.2	10.8	2
Thailand	14.3	2.9	15.5	-1.8	6.6	3.9
Philippines	9.5	12.6	12	8.6	20.9	8.3
Korea	14.9	16.6	24	13	23.6	13.3
World	6.7	6.9	8.9	6.1	10.3	4.3

Source: Adapted from Table 3.1 in World Bank (2000)

The other explanations for the sluggish export response during the crisis include the contraction in credit to private sectors (credit crunch hypothesis) and, as noted in Section 4.2.1, the impact of competitive depreciation. That is, the export decline in a country which experienced sharp exchange rate depreciation during the crisis might have been due to currency depreciation by its competitors. Duttagupta and Spilimbergo (2004) tested these explanations by estimating the short- and long-run export demand and supply equations of several Asian countries (Indonesia, Malaysia, Thailand, Korea, Singapore and Hong Kong). Their results provide only weak support for the credit-crunch hypothesis, primarily because there was mixed evidence about the relationship between the domestic credit variable and export supply price. In addition to this, they found a relatively quick adjustment in export supply, ranging between 1.5 and 2 years. As one would expect, the adjustment would have been longer than what was found if the credit-crunch hypothesis was true.

Duttagupta and Spilimbergo's findings on the credit-crunch hypothesis, as they also noted, are consistent with findings in other studies (Dwor-Frecaut et al. 2000; Gosh and Gosh 1999; Krueger and Tornell 1999). Drawing on the Mexican currency and banking crisis in 1994, Krueger and Tornell showed that firms in tradable sectors were not significantly affected by of credit crunch. They attributed the success of exporting firms in the tradable sector to the fact that, since the early 1990s, most of these firms had been able to obtain trade financing from the international capital market.

Duttagupta and Spilimbergo provide some evidence supporting the competitive devaluation explanation. From the supply side, they found that nominal depreciation resulted in lower export prices, suggesting that exchange rate depreciation should increase the export demand in a country. However, from the demand side they found that the export demand elasticity with respect to competitors' price was positive and large. Thus, export demand in a country would be reduced substantially if the country's export competitors also reduced their export price.

In the case of Indonesia, there were additional factors contributing to the sluggish export response. First, the social and political instability in 1998 caused international buyers to cancel export orders and shift to other countries. Rosner (2000) provides some support for this. He shows that exports of manufactured goods declined sharply during the second half of 1998 and, more importantly, his interviews with several textile, garment and footwear manufacturers confirmed that many companies suffered severe cutbacks in orders after the 1998 riots. The second factor causing the poor export performance was the rejection of Indonesian letters of credit from the beginning of 1998, which severely affected imports of some crucial products (Johnson 1998). The fall in imports would have been expected to affect the export performance of manufacturers who use a great deal of imported intermediate inputs or raw materials in their production. Finally, the poor export performance was also caused by the shortage of containers (Johnson 1998), since the collapse of imports greatly reduced the number of containers entering the country.

4.4 Summary

The literature provides several analytical approaches to examining the responses of firms to the crisis. The first, which comes from the crisis literature, argues that the responses were largely determined by the aggregate shocks experienced by the crisis-affected countries. Two aggregate shocks have received large attention in the Asian crisis literature: shocks to the financial sector and the sharp exchange rate depreciation. Although the importance of these aggregate shocks in shaping firms' responses is evident in several empirical studies, the discussion points to the uneven impact of these shocks on firms, depending on characteristics of companies and industries.

The second approach argues that the diversity of firm responses can be explained by the heterogeneity at their characteristics. This perspective agrees with the more general approach for analysing the heterogeneity of firm performances (Geroski 1998) and the resource-based theory of firms. Our chapter discussion highlights several characteristics which might have been important in shaping firms' diverse responses to the crisis, namely size, age, ownership, sales orientation, financial structure and production characteristics.

The other two approaches, derived from the industrial organisation literature, emphasise the importance of firms' strategic responses and the impact of greater competition in product market competition. The former suggests that the success of firms in weathering the crisis might have depended on their strategic responses. According to Porter (1980), these can be categorised into three broad groups of strategies: cost leadership, product differentiation and focusing on a niche market. The other approach argues that the success of firms may have been determined by the level of competition in the product market. The reasoning is that extent of the competition may change the behaviour of firms' managers and the equilibrium of collusive behaviour in the market.

A few researchers argue that, while helpful in explaining the patterns of firms' exports, only considering the aggregate shocks ignores significant differences across firms and industries. Several studies which explore this approach found that heterogeneity in the characteristics of firms had implication for the diversity firms' responses during the crisis. Most of these studies, however, tend to suffer from survival bias because they only include firms or plants that survived the crisis. The empirical work also shows that export recovery did not immediately take place. Several explanations were popularised in the literature. They include the combination of cyclical factors and structural characteristics of exports in the crisis-affected countries, curtailment of credit to the private sector and competitive depreciation.

Chapter 5

Data

5.1 Introduction

This chapter describes the data used for the empirical analyses. Section 5.2 describes and discusses the data base and Section 5.3 provides more detail on data cleaning and adjustments.

5.2 The data base

The data base for the empirical analysis is constructed from the following sources:

- The annual manufacturing surveys of medium- and large-scale establishments (*Statistik Industry*, or SI) from 1993 to 2000. The establishments are defined as those with 20 or more employees and the time period aims to capture the pre-crisis and crisis period. The surveys are undertaken by the Indonesian Central Board of Statistics (*Badan Pusat Statistik or* BPS).[1]
- The estimates of average tariff rates are taken from the Trade Policy Review (TPR) 1994, 1998 and 2003 published by the World Trade Organisation (WTO) (WTO 1995, 1998, 2003).
- The estimates of effective rate of protection are derived from Fane and Condon (1996).
- The data on imports are derived from UN Comtrade (United Nation Commodity Trade Statistics Database), provided by the IEDB (International Economic Data Bank) maintained by The Australian National University.

[1] BPS provided the author with the raw data of these surveys in electronic form.

In addition, other information is used for adjusting the data base and constructing the variables, with the following detail:

- Concordance Tables between ISIC (International Standard Industrial Classification) Revision 2 and 3, provided by BPS (BPS 2000).
- Concordance Table between ISIC Revision 2 and SITC (Standard Industrial Trade Classification) Revision 3 to transform import data, provided by IEDB.
- Concordance Table between ISIC Revision 2 and I-O (Input-Output) Table, provided by BPS.
- Wholesale Price Index (WPI) data at two- and three-digit industry level, provided by BPS and Garrick Blalock (Cornell University).

As noted in many studies, SI data are considered one of the best by the standard of developing countries. The data cover a wide range of information on the establishments, including some basic information (ISIC classification, year of starting production, location), ownership (share of foreign, domestic and government), production (gross output, stocks, capacity utilisation, share of output exported), material costs and various type of expenses, labour (head-count and salary and wages), capital stock and investment, and sources of investment funds.

However, the data have several limitations. First, they do not include information which can identify whether an establishment is a single-unit or a part of a multi-plant firm. As a result, establishments owned by an enterprise can not be linked up, and hence the number of enterprises is over-numerated: some plants may have been counted as firms whereas in practice they are not. Unfortunately, the extent of the over-numeration is unknown. Nevertheless, there are two reasons which suggest it might not have been large. First, a separate BPS publication that lists the surveyed firms reveals that the number of multi-plant firms is not large, i.e. about 500 to 1,000 firms out of more than 15,000 firms surveyed each year by BPS in the early 2000s.[2] Second, each plant might be run as an independent business, as plants owned by a multi-plant firm are not necessarily interconnected. However, this is likely to occur if each of the plants produces different goods.

[2] This information was provided by Dr. Sadayuki Takii.

The other limitation is that the surveys produce only annual data. In this study, the ideal is to have high-frequency data – either monthly or quarterly – because, especially during a crisis, firms' adjustment is likely to occur within a one-year period.

Finally, a few variables relevant to this study are not available. The surveys do not include the number of working hours, which is important for calculating a better labour productivity measure. They also do not include detailed accounting and financial information that fully reveals plants' financial leverage. Another unavailable variable is that which identifies whether or not plants are owned by business groups (conglomerates). Being part of a business group might be important in shaping the firm's response to the crisis because the group might support financially-distressed firms, owing to its business operation in diverse markets. Also, the surveys do not provide information on the skill content of employees. Finally, the surveys do not include the reasons for plants entering and exiting the industry. This information is important because there are substantial differences in the various modes of entry and exit.[3]

It is important to make a clarification here related to the unit of observation. That is, throughout this thesis, the terms of 'firm', 'company' and 'plant' are used interchangeably. In principle, the unit of observation of interest is firm (company), but, because of the data limitations, plant is used as the unit of observation. In other words, a single plant is considered as a firm. While this assumption clearly has a limitation – as it does not acknowledge the existence the multi-plant firms – it is still reasonable to accept the assumption, for the two reasons outlined above.

A plant-level unbalanced panel is constructed from 1993 to 2000. The panel is constructed by matching the plants according to the plant-code variable ($PSID$). While there is a possibility of mistakes in data-entry for each survey year, data examination suggests the extent of mistakes is low. Moreover it shows that the entry for $PSID$ is highly consistent, at least for the period covered in this study.

The panel has been cleaned and adjusted for some possible mistakes in data entry, for changes in ISIC, and for variable definitions. The cleaned panel contains about 11,000 to 13,600 plants over the period 1993-2000. The exact number of plants between the cleaned and original panel, along with the percentage difference between the two, are given in Table

[3] See the discussion about the measurement of entry and exit rates in Chapter 6.

5.1. The plants in the cleaned panel cover 71 and 60 per cent of manufacturing value added and employment respectively (see column five and six of Table 5.1). A more detailed description on the data cleaning and adjustment process is presented in the next section.

Table 5.1 The cleaned and uncleaned panel data: some statistics

Year	Number of plants		Difference	Coverage of the cleaned panel (%)	
	The cleaned panel	The uncleaned panel	between the uncleaned and cleaned panel (%)	Value added	Employment
1993	10984	18,163	-39.5	68	61
1994	10893	19,016	-42.7	70	60
1995	11578	21,551	-46.3	69	57
1996	12152	22,997	-47.2	72	58
1997	11908	22,386	-46.8	86	60
1998	11551	21,423	-46.1	69	60
1999	13343	22,070	-39.5	67	62
2000	13621	22,174	-38.6	70	63
Average	12,004	21,223	-43.3	71	60

Source: Author's computation.

The four-digit industry covered in the cleaned panel is smaller than those covered in the original SI data, which are 109 industries based on ISIC Revision 2. The main reason is the unavailability of ERP estimates, average tariff rates and import data for all 109 industries. The ERP estimates are available for 87 industries, of which 81 can be exactly matched with the ISIC SI data. Import data are taken from trade statistics (UN Comtrade) and in integrating them into the panel, some concordance difficulties are encountered between SITC – the industry classification used in the trade statistics – and ISIC. As for average tariff rates, the WTO provides them only for 72 industries.

Oil and gas refining sectors (ISIC 353 and 354) are excluded. They were only included in the survey in the 1990s and, by comparing their aggregate figures between SI and other data sources (i.e. National Income Statistics published by BPS), it is clear that the data are still weak.

5.3 Data cleaning and adjustment

This section provides more details on the cleaning and adjustment in the data set. Several studies (e.g. Ramstetter and Takii 2000; Blalock and Gertler 2004) indicate there are substantial errors at plant-level in the SI data. Like other micro-level studies, the approach taken by this study is rather *ad hoc*. Nevertheless, some basic steps and rules are applied in the cleaning and adjustment process. This process can be grouped into three broad steps, all of which are described in more detail below.[4]

5.3.1 Adjustment in ISIC codes

Within the period covered in the panel data, BPS changed the ISIC code from Revision 2 to Revision 3 starting from 1998.[5] Therefore the codes need to be harmonised. Because this study decided to base its analysis on ISIC codes Revision 2, some adjustments in the codes for the period 1998-2000 are necessary.

In practice, the adjustments should be straightforward, provided that the concordance table between the two codes is available. Indeed, BPS publishes this concordance table (BPS 2000). However, there are some complications. The main reason is that there are some Revision 3 codes which do not have one-to-one matches with those of Revision 2. Conceptually, this problem might be solved if the weights used for the mapping of the two versions of the codes are known. Unfortunately, this information is not available. In addition, the change in the codes is so large, which seems to have created some errors or incomplete ISIC entries in the SI data. To illustrate, there are about 9 per cent of total observations in the 1999 and 2000 data which do not have complete five-digit ISIC entries.

Given this information, the ISIC codes in 1999 and 2000 were adjusted according to some basic rules. No adjustment was made for the codes in 1998 because BPS still provides the two versions of codes for this year's data.

1. For observations in 1999 or 2000 which are observed in 1998, their ISIC codes were replaced with their 1998 codes.
2. For observations that appear only in 1999 or 2000 or both, the following adjustments were made:
    a. Observations which have incomplete ISIC entries (i.e. those which are reported only at one- to four- digit level) were identified. Of these observations, those which have the incomplete entries in both 1999 and 2000 up to three-digit level were first removed. The observations with incomplete entries in either 1999 or 2000 were retained. Following this step, observations which have inconsistent ISIC codes

[4] Appendix 6.1 lists and describes the variables from the SI data used in this study.
[5] BPS changes the ISIC codes about once every ten years.

between the two years, at two-digit level, were removed.

b. Of the retained observations after the previous steps, those which have one-to-one matching at the five-digit level between the two code versions were identified and adjusted accordingly based on the concordance table. Those which do not have the one-to-one matching, were firstly worked on the concordance table of these codes to identify the highest digit-level for which the corresponding ISIC Revision 2 is the same. Table 5.2 presents the results of this computation. Based on these results, observations were removed for which the largest corresponding digit-levels are one or two, such as 19209 and 28920 but the rest were retained (see Table 5.2).

Following the above adjustments, we check for consistency of the ISIC codes for every plant over the panel period. Plants with inconsistent codes at two-digit level were removed but those with inconsistent codes at three- to five-digit level were retained. The deletions were motivated by the fact that a plant might produce more than one good in a year but the amount of goods it produces might vary significantly across years. The cutting rule of two-digit is applied because only at this level can the industry characteristics be considered to be substantially different.

Table 5.2 ISIC Revision 2 and 3: some ambiguous concordance

ISIC Revision 3	ISIC Revision 2	The largest digit-level for which the ISIC Rev. 2 are the same
15131	31131-32	4
15491	3122122	4
15492	31231-32	4
15493	31241-42	4
15494	31243-45	4
15495	31246 31249	4
15496	31251-52	4
15497	31261-62	4
15499	31271 31279	4
19113	32331-33 32339	4
19209	32419-20 35602	1
26509	36919 36929	3
27202	37203 38194	1
28910	37104 37205	2
28920	37101-4 37201-5 38191-9	1
28932	38112 38119	4
28939	38192 38199	4
29112	38212 38412	2
29120	38293 38295 38297	4
29141	38292 38297	4
29142	38295 38297	4
29150	38292 38297	4
29193	38294 38297	4
29199	38295-97	4

Table 5.2 continued

Table 5.2 concluded

ISIC Revision 3	ISIC Revision 2	The largest digit-level for which the ISIC Rev. 2 are the same
29240	38292 38297	4
29262	38291 38297	4
29299	38241-47	4
29301	38113-14 38120	3
31101	38312 38317	4
29230	38292 38297	4
29224	38315 38317	4
31102	38311 38317	4
31103	38313 38317	4
31201	38314 38317	4
31900	38316-17 38399	3
33119	38323 38511-14	2
33130	38511-13	4
35115	38243-44	4
36991	39051 39059	4
36999	39014 39090	3

Source: BPS, 2000. *Tabel Kesesuaian Lapangan Usaha/Kegiatan Ekonomi*, *KBLI 2000 - KLUI 1990*, BPS: Jakarta

5.3.2 Consistency of variable definitions in SI data

The consistency of variable definitions over time was checked. While they are generally consistent, BPS might have changed some of the definitions. Data examination at the computational stage revealed the definitions are relatively consistent, albeit there is a large variation in the enumeration of some variables. Despite that, one important variable was found to have different definitions. For the period 1993-96, *LPMNOU* and *LPWNOU* were defined as the number of male- and female-paid production workers, but for the period 1997-2000, they were defined as the number of male- and female- unpaid production workers.

5.3.3 Corrections for errors in data entry

This study focuses on growth in real value added and employment, and we sought to detect observations which contain errors, due to misreporting or key-punching mistakes. The variables refer to *VTLVCU* and *LTLNOU* in the SI data (see Appendix 5.1). The choice of the variables is based on a well-established perception in the studies using SI data that the variables are consistent and contain minimum errors. Following the usual approach in other studies (e.g. Hall and Mairesse 1995), observations were removed for which the growth rates of real value added were less than minus 90 per cent or greater than 300 per cent, or for which the growth rates of employment were less than minus 70 per cent or greater than 200 per cent. This removed about 11 per cent of observations for every year's observations in the panel.

It is important to note that the approach might have removed the 'true' observations, particularly when the decision was based on the growth in value added. Nevertheless, the possibility of this occurring is low. In principle, this is because the approach also considers employment growth. Contraction in the rate of employment was unlikely to have been more than that defined in the decision rule, because firms are likely to hoard labour during a difficult situation.[6] Meanwhile, intuitively it is also difficult to argue that during a deep economic contraction firms would have increased employment at a rate exceeding the one defined in the decision rule. This argument also applies even if some firms were in fact significantly better off (e.g. from higher exports due to the competitiveness effect of the sharp exchange rate depreciation). This is because the process of hiring new employees takes a considerable length of time, suggesting a sudden jump in a firm's employment stock would have been unlikely.

[6] The findings in the next few chapters in fact support this argument.

Another error concerns missing observations. Having constructed the panel data, observations were detected which contain temporary missing observations over time. Observations that contain at least two temporary missing observations were removed but those with only one temporary missing were retained. The variables' values of the retained observations were replaced with those of the previous year. Single-entry observations, i.e., those which appear only once during the panel period, were also removed because they might reflect an error in the entry of the PSID (establishment code) variable.

It is worth mentioning here that very few observations were found with missing values in value added and output variables ($VTLVCU$ and $OUTPUT$) but not in other variables. This appears mostly in data for 1996 and 1997. These observations were retained because the values of other variables are consistent and do not seem to contain errors. The missing variables' values were replaced by those of the previous year.

This study also considers error correction in the variables used to construct independent variables. Ideally, we would examine all of the relevant variables. However, because the tedious and time-consuming nature of data cleaning process, examining each of these variables is beyond the scope of this thesis. Therefore, this study only considers several variables, namely year of starting operation, foreign and government ownership shares, and the percentage of output exported. Most of these variables were found to contain some errors or inconsistency. It is important to mention that for the year of starting production and the ownership variables, the adjustments are focused only on the variables' value in 1995 and 1996, although their consistency were examined for the whole period of the panel.

Year of starting operation

Data-entry error or misreporting in the variable of the year of starting operation ($DYRSTR$) is significant. About 14,000 observations (50 per cent of total observations) in the raw panel display inconsistency. For these plants, the entries are not the same for some years within the panel period. Moreover, some entries clearly show obvious mistakes, such as 0 or 1. Because of the large number of inconsistencies, removing the observations is clearly not the first-best option and, hence, some adjustments were made on these observations.

To correct this variable, ideally it is necessary to know in which year the observation was observed for the first time. However, applying this rule is impossible, for at least three reasons. First, the time series covered in this study began in 1993. For observations that are always observed during the panel period, it is difficult to determine when they appear for the first time. Second, even if a much longer panel data is available, identifying when an observation appears for the first time might be misleading. SI data were known to be more under-enumerated in the 1970s and 1980s, so that the first appearance is not necessarily the birth year of a plant. Finally, reported data on this variable is apparently characterised to have some variation between years. According to a BPS official, this is due to lack of knowledge on the part of people responsible for responding to the questionnaire.[7]

Based on this information, the following steps and rules were applied in adjusting $DYRSTR$:

1. Define $DYRSTR_{i,t}$ equal to the entry on the variable for which i (a plant) is observed in t = 1993, ..., 2000,

   then we computed $\Delta DYRSTR_{i,t} = DYRSTR_{i,t} - \overline{DYRSTR_i}$
2. Following (1), observations in the raw data were segregated into three groups:
   - Group 1: including those for which all $\Delta DYRSTR_i$ over the period 1993-2000 meet the rule that $-2 \geq \Delta DYRSTR_{i,t} \leq -2$.
   - Group 2: including those for which all $\Delta DYRSTR_i$ over the period 1993-2000 meet the rule that $-10 \geq \Delta DYRSTR_{i,t} < -2$ or $2 > \Delta DYRSTR_{i,t} \leq 10$.
   - Group 3: including those for which one of $\Delta DYRSTR_i$ over the period 1993-2000 meets the rule that $A < -10$ or $A > 10$.

[7] Interviews with BPS officials, June, 2003.

The decision rule for each group is based both on conversation with a BPS official and data examination. According to the BPS official, the 'true' $DYRSTR$ entries are those which were mostly and/or most recently reported. A data examination in the experiment stage suggested the acceptable values of $\Delta DYRSTR_i$, which reflect the situation advised by the BPS official, are bounded between -10 and 10. Clearly, the suggestion is rather subjective. While not ideal, this approach is unavoidable, because it is difficult to ascertain whether an ambiguous entry, or a series of inconsistent entries, can be classified as an error. The difficulty arises both because determining the exact birth of a plant is impossible, for the reasons mentioned earlier, and because there are no other variables that can be confidently used to cross-check the correctness of the entries.

Despite the weakness in the decision rule, some adjustments were made, according to some rules in the following three steps:

3. Within Group 1, no adjustment was made for the observations with $\Delta DYRSTR_{i,t} = 0$ (since they are the correct entries), while for the other observations, the entries were replaced by the last non-missing entry.
4. For Group 2, firstly the entries were tabulated to create a frequency table. After that, entries were replaced by the mode of the frequencies. In the case where the mode is ambiguous, they were replaced by the most recent and consistent series of entries. This rule was applied following the advice from a BPS official mentioned earlier.
5. Finally, all observations in Group 3 were removed, since the likelihood of mistakes is high for this group.

Examples of the adjustments based on the above rules are given in Table 5.3.

Table 5.3 Examples of adjustment on DYRSTR variable

Description	Version of raw data	Examples								Remarks
		$DYRSTR_{1993}$	$DYRSTR_{1994}$	$DYRSTR_{1995}$	$DYRSTR_{1996}$	$DYRSTR_{1997}$	$DYRSTR_{1998}$	$DYRSTR_{1999}$	$DYRSTR_{2000}$	
Step 3, adjustment for Group 1	Uncleaned	1993	1993	1993	1993	1993	1993	1993	1993	$\Delta DYRSTR_{i,t} = 0$,
	Cleaned	1993	1993	1993	1993	1993	1993	1993	1993	no adjustment
	Uncleaned	1991	1992	1992	1992	1990	1990	1990	missing	$-2 \geq \Delta DYRSTR_{i,t} \leq 2$
	Cleaned	1990*	1990*	1990*	1990*	1990	1990	1990	missing	replaced by $DYRSTR_{i,1999}$
	Uncleaned	1990	1990	1987	1987	1987	1990	1990	1990	$-2 \geq \Delta DYRSTR_{i,t} \leq 2$
	Cleaned	1990	1990	1990*	1990*	1990*	1990	1990	1990	replaced by $DYRSTR_{i,2000}$
Step 4, adjustment for Group 2	Uncleaned	1982	1986	1986	1986	1982	missing	missing	missing	mode = '1986',
	Cleaned	1986*	1986	1986	1986	1986*	missing	missing	missing	replaced all entries by '1986'
	Uncleaned	1962	1962	1962	1962	1980	1980	1980	1980	mode = '1962' and '1980',
	Cleaned	1980*	1980*	1980*	1980*	1980	1980	1980	1980	replaced by '1980', because it was the most recent entry for the last four years of the panel (1997-2000)
Step 5, adjustment for Group 3	Uncleaned	1968	1992	1972	1992	1980	1986	0	0	$\Delta DYRSTR_{i,t} < -10$ or
	Cleaned	This observation was removed*								$\Delta DYRSTR_{i,t} > 10$

Note: * marks the adjusted entry.

Source: Author's computation.

Ownership shares

Data examination revealed about 300 entries in the foreign share variable ($DASING$) which are not consistent over the panel period. Although this inconsistency might reflect a real change in ownership, most are likely to be the result of data entry error or misreporting.

About 45 per cent of the total observations were identified as inconsistent. The following rules were applied to adjust these observations. Here the rules focus on the entries of 1995 and 1996 since only these years were considered in the subsequent analyses with respect to ownership variables:

- If $DASING_{1994} > 0$, and $DASING_{1995} = 0$ and $DASING_{1996} > 0$, $DASING_{1995}$ was replaced by $DASING_{1996}$.
- If $DASING_{1994} > 0$ and $DASING_{1995} > 0$, and $DASING_{1996} = 0$, $DASING_{1996}$ was replaced by $DASING_{1997}$, provided that $DASING_{1997} > 0$. If $DASING_{1997} = 0$, $DASING_{1996}$ is replaced by the subsequence entries for which $DASING_t > 0$ for $t = 1998, 1999, 2000$.
- If $DASING_{1994} > DASING_{1995} < DASING_{1996}$ and $DASING_{1996} = DASING_{1997}$, $DASING_{1995}$ was replaced by $DASING_{1996}$.
- If $DASING_{1995} > DASING_{1996} < DASING_{1997}$ and $DASING_{1997} = DASING_{1998}$, $DASING_{1996}$ was replaced by $DASING_{1997}$.
- If $DASING_{1995} > 0$ and $DASING_t = 0$ for $t =$ 1993, 1994, 1996, …, 2000, the observation was removed.
- Similarly, if $DASING_{1996} < 0$ and $DASING_t = 0$ for $t =$ 1993, 1994, 1995, 1997, …, 2000, the observation was removed.

Table 5.4 provides examples of the adjustment made based on the above rules. Following these adjustments, the other ownership shares variables ($DDMSTK$, $DPUSAT$ and $DPEMDA$) were adjusted accordingly, with the sum of all ownership variables to equal to 100.

Table 5.4 Examples of adjustment on DASING variable

Description	Version of panel data	Examples							
		$DASING_{1993}$	$DASING_{1994}$	$DASING_{1995}$	$DASING_{1996}$	$DASING_{1997}$	$DASING_{1998}$	$DASING_{1999}$	$DASING_{2000}$
Rule 1	Uncleaned	missing	75	0	60	40	missing	missing	missing
	Cleaned	missing	75	60*	60	40	missing	missing	missing
Rule 2	Uncleaned	70	70	35	0	35	35	35	35
	Cleaned	70	70	35	35*	35	35	35	35
	Uncleaned	90	60	60	0	0	39	31	31
	Cleaned	90	60	60	39*	0	39	31	31
Rule 3	Uncleaned	75	75	67	70	70	70	70	93
	Cleaned	75	75	70*	70	70	70	70	93
Rule 4	Uncleaned	missing	0	60	40	60	60	51	51
	Cleaned	missing	0	60	60*	60	60	51	51
Rule 5	Uncleaned	0	0	100	0	0	0	0	0
	Cleaned	This observation was removed*							
Rule 6	Uncleaned	0	0	0	100	0	0	0	0
	Cleaned	This observation was removed*							

Note: 1. * marks the adjusted entry.

2. DASING is in per cent.

Source: Author's computation.

Following the above adjustments, the data was examined for consistency with respect to the government-ownership shares variables ($DPUSAT$ and $DPEMDA$). Slightly less observations that exhibit inconsistency were found, at about 200 and 150 for $DPUSAT$ and $DPEMDA$, respectively. The entries of these variables were adjusted using the same rules applied earlier for $DASING$.

Percentage of output exported

The raw panel data was examined for data-entry errors in the variable of percentage of output exported ($PRPREX$). Here, the focus is to identify and adjust entries exceeding 100 per cent. Consistency over time is not the focus because plants might change their proportion of output exported in every year. In this respect, it was found that the $PRPREX$ entries for the period 1993-96 are cleaned. As shown in Table 5.5, there are no entries in which $PRPREX > 100$ per cent in the raw panel data. However, for the period 1997-2000, the picture is different. Some entries exceed 100 per cent, with those in 1998 being the largest.

Table 5.5 Number of plants by status PRPREX entries in uncleaned panel data

Status of the entries	Year							
	1993	1994	1995	1996	1997	1998	1999	2000
PRPREX>100%	0	0	0	0	2	253	16	10
0%>*PRPREX*≤100%	3,219	3,390	3,625	4,357	3,059	500	3,012	3,663

Source: Author's computation.

Therefore, the following adjustment rules were applied:

- If $PRPREX_t > 100$ for $t = 1997, \ldots, 2000$, it was replaced by $PRPREX_{t-1}$, starting from 1997. It is worth mentioning here that all adjusted entries in 1998 have positive $PRPREX$ in 1997. Thus none were replaced by zero.
- A slight modification of the rule is applied for the entries in 1999. That is, if $PRPREX_{1999} > 100$ and $PRPREX_{1998} = 0$, $PRPREX_{1999}$ was replaced by $PRPREX_{2000}$.

Table 5.6 provides examples of the changes on $PRPREX$ entries based on the above rules.

Table 5.6 Examples of adjustment on PRPREX variable

Description	Version of panel data	Examples								Remarks
		$PRPREX_{1993}$	$PRPREX_{1994}$	$PRPREX_{1995}$	$PRPREX_{1996}$	$PRPREX_{1997}$	$PRPREX_{1998}$	$PRPREX_{1999}$	$PRPREX_{2000}$	
Rule 1	Uncleaned	100	79	49	100	927	0	90	80	$PRPREX_{1997}>100$
	Cleaned	100	79	49	100	100*	0	90	80	
	Uncleaned	missing	100	100	100	100	181	100	100	$PRPREX_{1998}>100$
	Cleaned	missing	100	100	100	100	100*	100		
	Uncleaned	80	40	62	0	25	25	105	0	$PRPREX_{1999}>100$
	Cleaned	80	40	62	0	25	25	25*	0	
	Uncleaned	89	0	0	98	53	0	98	949	$PRPREX_{2000}>100$
	Cleaned	89	0	0	98	53	0	98	98*	
Rule 2	Uncleaned	24	29	28	23	100	0	733	61	$PRPREX_{1999}>100$
	Cleaned	24	29	28	23	100	0	61*	61	and $PRPREX_{1998}=0$

Notes: 1. * marks the adjusted entry.
2. PRPREX is in per cent.

Source: Author's computation.

Appendix 5.1 Variables from SI data used in this study

No.	Variable	Description
1.	PSID	Establishment code
2.	PROD5D[1]	ISIC code, Revision 2
3.	DISIC5[2]	ISIC code, Revision 3
4.	DYRSTR	Starting year of commercial operation
Location variables		
5.	DPROVI	Province
6.	DKABUP	Regency
Cost and input variables		
7.	RTLVCU	Total material cost
8.	RDNVCU	Domestic materials
9.	RIMVCU	Imported materials
10.	EFUVCU	Energy cost
11.	EPLVCU	Expenditure on electricity: from PLN[3]
12.	ENPVCU	Expenditure on electricity: from non-PLN
13.	IINVCU	Expenditure on interest payment
14.	IT1VCU	Total cost
15.	IINPUT	Total input
Output variables		
16.	OUTPUT	Output produced
17.	PRPREX	Proportion of exported output
18.	VTLVCU	Value added
Employment variables		
19.	LTLNOU	Total number of employees
20.	LPRNOU	Total number of production employees
21.	LNPNOU	Total number of non-production employees
Wage and salary variables		
22.	ZPDVCU	Wage and salary of production employees
23.	ZNDVCU	Wage and salary of non-production employees
Investment variables		
24.	FLDOCU	Source of fund for investment: domestic loan
25.	FLFOCU	Source of fund for investment: foreign loan
26.	FTTLCU	Source of fund for investment: total

Note: 1. Available only from 1993-98.
2. Available only from 1999-2000.
3. PLN (*Perusahaan Listrik Negara*) or State-owned Electricity Company

Source: Annual Manufacturing Survey, 1993-2000, BPS.

Chapter 6

Impact of the Crisis on Indonesian Manufacturing

6.1 Introduction

This chapter paints a picture of the impact of the crisis on Indonesian manufacturing. The descriptive analysis presented highlights some basic facts about how the crisis affected the industry, and provides a backdrop for the statistical analysis in subsequent chapters.

This chapter is organised as follows. Section 6.2 discusses the conceptual approach in measuring the impact of the crisis. Section 6.3 and 6.4 document the basic facts of the crisis impact on the manufacturing performance and demographics of plants. Finally, Section 6.5 summarises the main findings of the chapter.

6.2 Measuring the impact of the crisis

In evaluating how the crisis affected Indonesian manufacturing, this study focuses on two aspects: the impact on performance and the impact on plants demographics. The latter is considered because focusing only on performance may give an incomplete picture about the overall impact of the crisis on the industry. For example, it does not capture the extent to which the crisis forced some firms to leave the industry. As noted in Chapter 4, the incidence of firm exit during the crisis was likely to be high during the peak of the turmoil.

To organise the discussion, the description of the variables which represent these two aspects is postponed until Section 6.3 and 6.4. Before discussing the results, it is important to firstly outline the conceptual approach for measuring the impact of the crisis.

To measure the extent of the crisis' impact on the industry, this study takes the percentage difference of the considered variables between the crisis and pre-crisis periods. Throughout this thesis, the crisis period is defined as the period 1997-2000, with subdivisions as noted later. This definition is based on the fact that the crisis began on about the fourth quarter of 1997 and the picture shown in this chapter is that industry began to recover in 1999 and 2000. It is important to note, though, that the 1997 data might give an ambiguous picture, as there might be a time lag in order for the crisis to show some negative impact. The pre-crisis period is defined throughout the thesis as the period 1995-96. This definition, which excludes the period 1993-94 covered by the data base, is mostly intended to capture the situation just before the crisis. The exclusion is aimed at minimising the variation in some of the variables' values, which can vary substantially even in a very short time period.

Letting y denote the variables, the measure to estimate the impact of the crisis is defined as

$$\%\Delta y_t = \frac{y_t - \bar{y}_{9596}}{\bar{y}_{9596}} \times 100 \qquad (6.1)$$

where t = 1997, ..., 2000 and $\bar{y}_{9596}$ is the average of the variables for 1995 and 1996.

It is important to note the weakness of the method given by the formula in (6.1). In principal, it tends to understate the true magnitude of the impact as it only compares the pre-crisis level of the variable, but not the level it would have attained had there been no crisis. Obviously, an alternative way to measure the impact is to take the difference to an established counterfactual, reflecting the situation in the absence of the crisis. In the quasi-natural experiment literature, this method is known as the difference-in-difference (DID) method, and the counterfactual description is often termed as the control group (Meyer 1995). Although the DID method should give a more robust evaluation of the crisis' impact, implementing the method is not possible because the control group does not exist. In this study, all plants in the industry were essentially exposed to the crisis, regardless of the fact that the degree of exposure might have varied across plants.

6.3 The impact of the crisis on performance

This section examines the data to draw several facts about how the crisis affected the performance of the industry.[1] We first discuss the performance variables used in this study.

6.3.1 The performance variables and their measurements

There is a range of measures to represent performance. The choice of the measures is usually based on the study's objective and, often, data availability. Given the information provided by SI data, this study considers the following measures: output, employment, labour productivity and profitability.

Output

The preferred measure of output is physical output. In practice, however, information on the unit of physical output is often unavailable. Even when the information is available, it does not reflect the quality of goods that may change over time. For this reason, the measure of output is generally obtained by deflating the nominal value of output by an appropriate price index. Using a deflated output series, however, has some drawbacks. First, common practice usually uses the aggregate price index at the industry level. Therefore, the index does not represent the price of goods faced by individual firms, which is likely to vary across firms because of differences in costs of production, market structure (perfectly or monopolistic competitive) or type of goods (i.e. homogenous or differentiated). Second, even when the price index is adjusted for quality, the method for deriving the index by a statistical agency may not capture the complete quality change in output, since it is created by observing the changes in prices of a representative sample of goods. Thus, overall, the deflated output only gives an approximation on the quantity of goods produced.

Bearing these limitations in mind, this study uses deflated output to estimate the quantity of output produced. Although the extent of bias from using deflated output is not clear, it seems reasonable to presume that the deflated output during the crisis period tends to overstate the true output produced. Firms are likely to focus on activities aimed at generating cash flow as a means of survival rather than activities aimed at improving the quality of goods. This study uses wholesale price indices (WPI) at the two- and three-digit commodity level.

[1] To organise the analysis, the description of how the crisis affected Indonesian manufacturing exports is presented in Chapter 9.

This study considers real gross output (ROUT) and real value added (RVA) as proxies for output produced, defined as nominal gross output and value added deflated by WPI, respectively. Gross output represents the value of sales adjusted for the stock of inventories but without adjustment for the use of intermediate goods. Value added subtracts for the value of intermediate goods from gross output.

Both proxies are considered because each has its own strength and limitation. Gross output may be more realistic than value added in representing the quantity of output produced. For example, the output of a garment firm is garment products and not the "value added of garment products". The use of value added as a concept of output, nonetheless, is still relevant for two reasons. First, value added avoids the bias that arises from double-counting due to flows of goods within and between industries. Value added, therefore, gives more reliable output approximation than gross output at a more aggregated level. Second, value added might be more relevant to the idea of firm performance when a firm is profit-maximising. As broadly defined in Nickell (1995), a successful firm is one that produces a lot of output relative to the input it uses, which obviously corresponds to the concept of value added.

Employment

Employment is measured by the total number of paid employees (EMPL), which consists of production and non-production workers. The head-count measure is chosen because the number of hours worked, which is the ideal measure of employment, is not available.

The use of the head-count measure, however, has limitations. The main one is that it hides the variations or changes in employees' average working time, most of which is a result of changes in the number of shifts, holding multiple jobs and differences in quality across the employees. Therefore, the head-count measure overstates the true level of employment. This bias tends to be large for the crisis period, as firms might have hoarded labour because of the high costs of firing and re-hiring.[2] The extent of the bias, unfortunately, is difficult to predict. On the one hand, it tends to be higher in firms or industries that employ large numbers of skilled employees, because of firms large investment in building the human capital of these employees. On the other, the financial distress faced by firms in a deep economic crisis might leave them with no other choice but to reduce their employees. Earlier it is observed by

[2] As noted in Chapter 4, there is evidence from previous studies suggesting that firms in the crisis-affected countries hoarded labour during this time.

Geroski and Gregg (1997) that many firms in the UK reduced employment in response to the recession.

Labour productivity

This study employs real value added per labour (RVL) as a proxy for labour productivity. Value added is chosen to proxy output, instead of gross output, because it avoids the double-counting problem and is less sensitive to the substitution between intermediate and labour inputs.

There is a weakness in using the proxy, however. This is because, as explained, labour input is not perfectly measured. The prediction that firms might hoard labour during a recession could overstate the level of labour input, and hence understate labour productivity. Because the extent of labour hoarding is difficult to estimate, the extent of bias from using RVL, accordingly, is also not clear.

Profitability

The ideal measure of profitability is some measures of rate of return, which indicates the rate at which firms are able to generate profits for every unit of assets employed. Empirical studies usually employ the accounting-based return measures. The most often used are return on assets (ROA) and return on equity (ROE). Neither of these measures is used in this study, because the data on equity are not available and the data on assets are not reliable.

As an alternatively, we use price-cost margin (PCM) as the proxy for profitability. PCM is defined as the ratio of gross profit to sales:

$$PCM = \frac{output - inputs - wages}{output}$$

Gross profit is computed as the value of output minus inputs, and wages and salary. Included in inputs are raw material, fuel and electricity.

The main criticism of PCM is related to its purpose. In empirical literature, PCM is often used as a proxy of the Lerner index, which measures the ability of a firm to elevate price above marginal costs. Therefore, PCM is more appropriately used as a proxy to measure the extent of competition in product markets. Nevertheless, a positive correlation between PCM and the return measures is often found in the empirical literature, justifying PCM as a proxy for profitability.[3]

6.3.2 Descriptive analysis[4]

6.3.2.1 Industry-level data

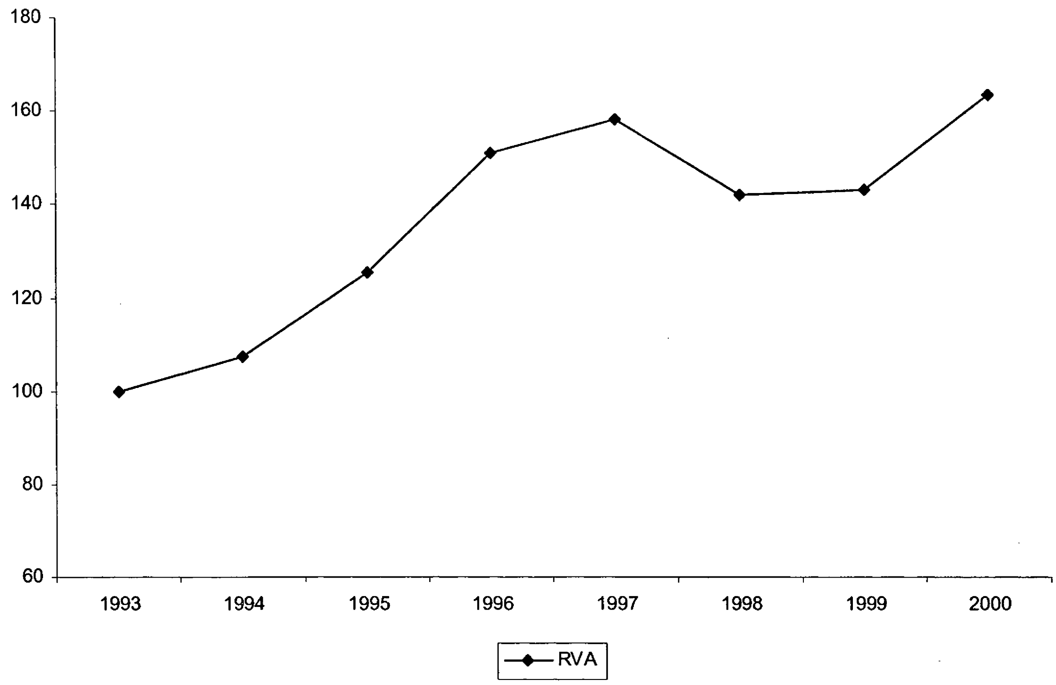
Figure 6.1 displays indices of the performance variables for manufacturing industry from 1993 to 2000. To avoid the bias from double-counting, only RVA is considered to proxy output.

[3] Collin and Preston (1969) found a correlation of 0.8, while Liebowitz (1982) found a correlation of about 0.3 to 0.4.

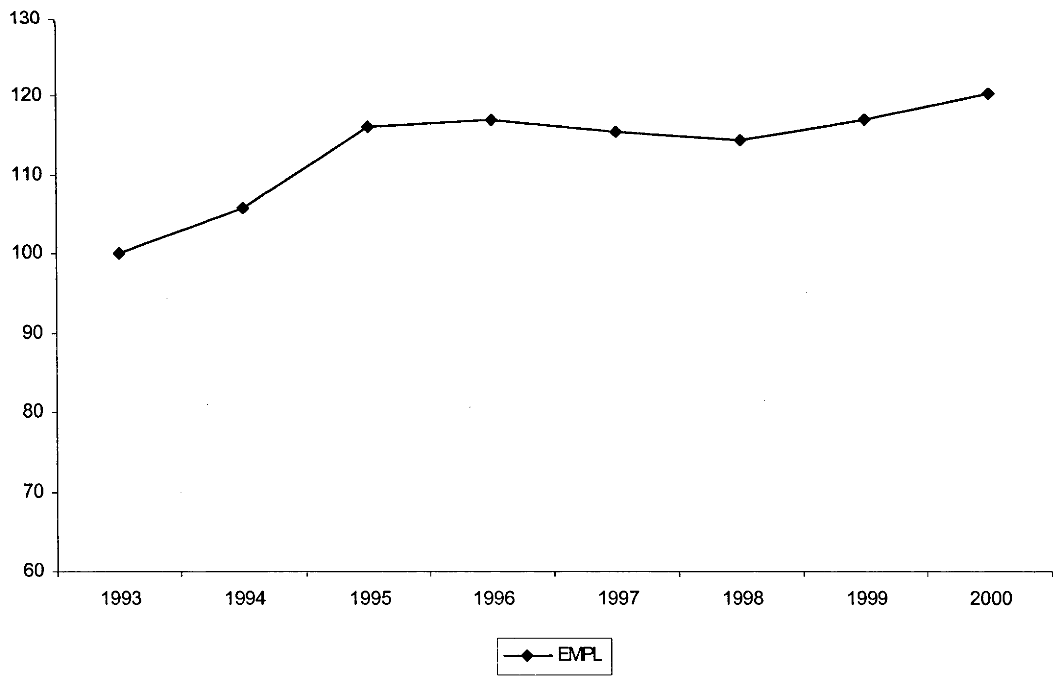
[4] Unless otherwise stated, the source of the tables and figures in this section and Section 6.4 is the author's computation from the SI data.

Figure 6.1 Trends in the performance indices (1993=100), 1993-2000

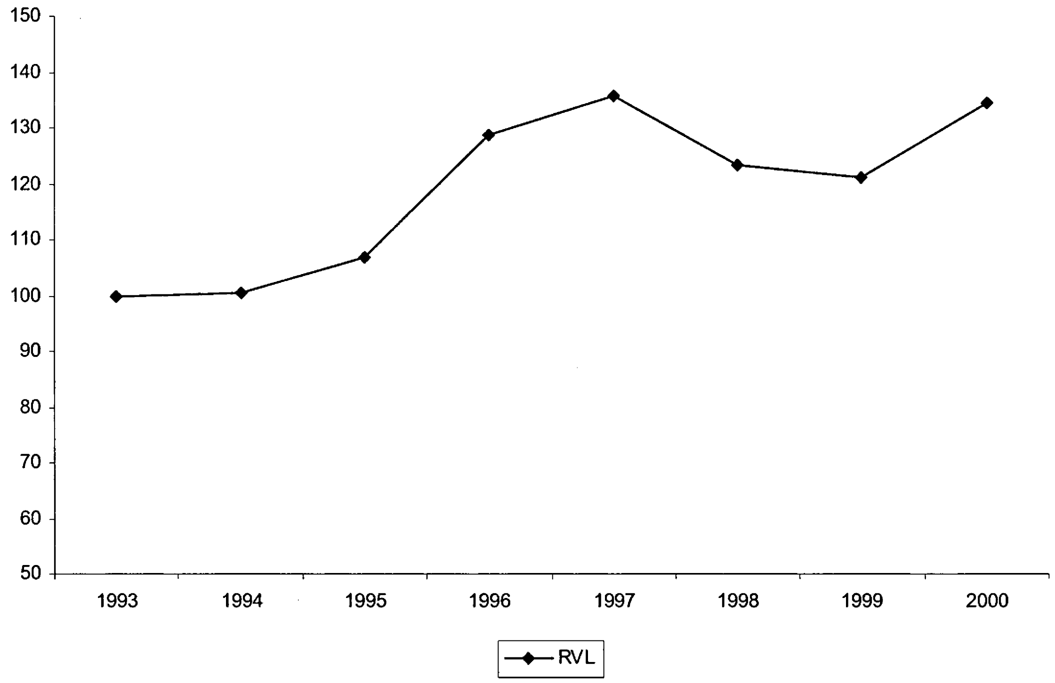
a. Real value added (RVA)



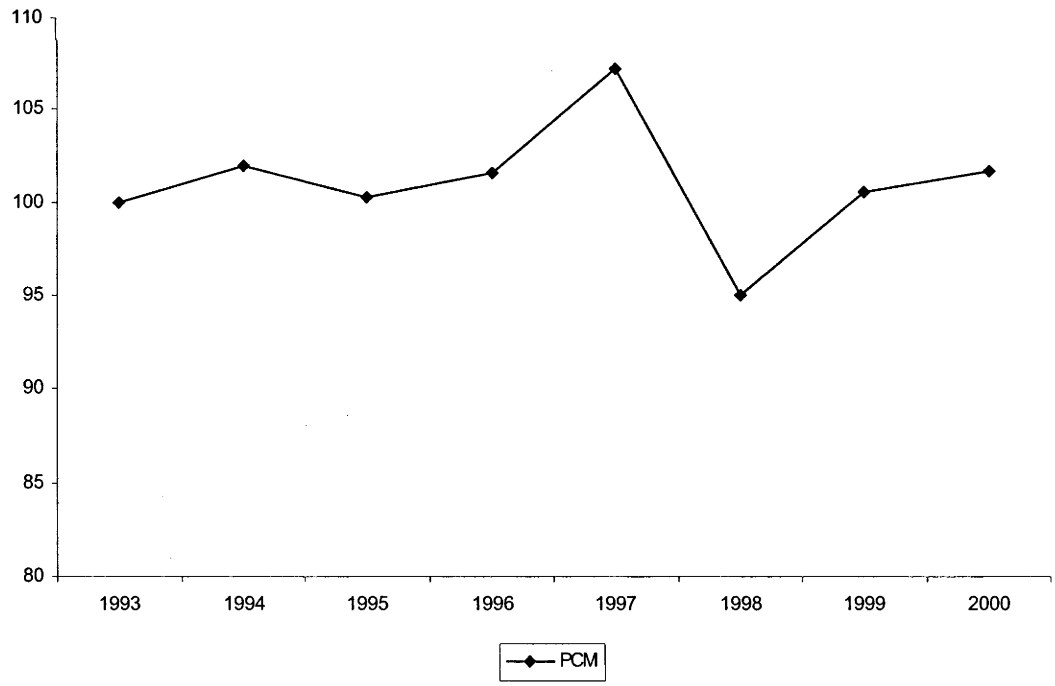
b. Employment (EMPL)



c. Real value added per labour (RVL)



d. Price-cost margin (PCM)



The prevailing pattern is broadly the same across the variables. That is, after a sharply rising trend before the crisis, it declined substantially during 1998 and 1999, and is followed by a modest increase in 2000. This is consistent with the picture of the crisis impact on the general economy as described in Chapter 3. The figures also suggest that the beginning of recovery in 2000 is robust, as the level of performance reached that of the pre-crisis level (1995 and 1996).

The figure shows that the crisis immediately affected performance in 1997 in terms of output, employment and labour productivity, but not in terms of profitability. This can be seen more clearly in Table 6.1, which shows growth of the above indices. The aggregate growth of PCM in fact increases significantly, by 5.5 per cent in 1997, before contracting in 1998. The table also shows that the immediate impact on employment has been so large, compared to the impact on output and labour productivity. However, employment begins to recover in 1998. This finding contradicts other studies, such as Manning (2000), which indicated that the major adjustment in the labour market occurred in wage levels rather than employment levels, and during 1998. To gain more of an insight into this matter, it is useful to examine how the crisis affected the aggregate performance at the more disaggregated industry level.

Table 6.1 Growth in the performance variables (%), 1994-2000

	1994	1995	1996	1997	1998	1999	2000
Real value added (RVA)	7.5	16.6	20.4	4.8	-10.4	0.8	11.3
Employment (EMPL)	5.8	9.7	0.8	-1.3	-0.9	2.3	2.9
Real value added per labour (RVL)	0.6	6.3	20.2	5.6	-9.1	-1.8	10.9
Price-cost margin (PCM)	1.9	-1.6	1.3	5.5	-11.4	5.9	1.0

Table 6.2 presents the percentage difference of the performance variables computed using the formula in 6.1 by broad industry group.[5] The table shows the impact of the crisis was felt differently across industries. While this observation has been noted in previous studies (e.g. Thee 2000; Fukuchi 2000), the table provides more insights into what happened during the crisis. First, some industries actually benefited. This is shown by the difference for the period 1998-2000, based on the differences in output and labour productivity. These industries are textile-and-garments, wood and paper products (ISIC 32 – 34) – all of which recorded higher positive percentage differences during the peak compared to the beginning of the crisis. The wood and paper products industries seem have benefited most. Its output increased by about 50 to 60 per cent in 1998, the peak of the crisis. The food and beverage industry improved its performance slightly in terms of output but not in terms of the other performance variables.

[5] At aggregate industry-level, the formula in 6.1 for industry j can be written as follows

$$\%\Delta y_{j,t} = \frac{y_{j,t} - \bar{y}_{j,9596}}{\bar{y}_{j,9596}} \times 100$$

While some industries benefited, basic metal and machinery industries (ISIC 37 and 38) were the hardest hit. Over the period 1998-2000, contraction in the basic metal industry was extremely large, about 60 to 70 per cent in output and labour productivity.

The second observation is that adjustment in employment, particularly during the period 1998-2000, took place both in labour- and capital-intensive industries, and the immediate employment contraction in 1997 was caused by the large contraction in the food and beverage industry (ISIC 31). Comparing the differences in employment to those in output, the output expansion observed earlier in the food-beverage and textile-garment industries appeared, to some extent, to be a result of a reduction in employment. This suggests a large cost-reduction adjustment of firms in these industries. The comparison also indicates labour hoarding appeared to happen mostly in capital-intensive industries. For example, the deep contraction in output of the basic metal industry (ISIC 37) is accompanied by a less than 10 per cent contraction in employment. This observation is consistent with a finding by Fukao (2001) which revealed that instead of dismissing them, many Japanese-owned firms sent their employees for training during the crisis.

Table 6.2 Aggregate performance difference by broad industry group (%)

a. Real value added (RVA)

ISIC	Industry	1997	1998	1999	2000
31	Food and tobacco products	14.3	16.8	15.4	19.5
32	Textile, garment and leathers	8.5	30.7	18.6	24.4
33	Wood products, incl. Furniture	8.2	58.0	33.0	31.0
34	Paper and paper products	15.7	52.0	27.5	40.0
35	Chemical, rubber and plastics	33.2	16.3	49.2	64.2
36	Non-metallic mineral products	29.3	2.6	-1.3	29.1
37	Basic metal industries	22.6	-74.7	-69.9	-63.9
38	Machinery and equipment	4.7	-3.9	-3.6	56.2
39	Other manufacturing	39.9	86.6	44.0	52.8

b. Employment (EMPL)

ISIC	Industry	1997	1998	1999	2000
31	Food and tobacco products	-7.4	-1.7	-3.0	0.0
32	Textile, garment and leathers	0.3	-4.2	0.7	5.5
33	Wood products, incl. Furniture	0.3	2.9	4.5	2.1
34	Paper and paper products	6.5	14.9	0.5	5.8
35	Chemical, rubber and plastics	-0.8	1.0	2.1	6.8
36	Non-metallic mineral products	-0.6	-12.1	-9.8	-9.5
37	Basic metal industries	4.9	-7.6	-8.6	-6.7
38	Machinery and equipment	1.9	-8.2	1.8	5.6
39	Other manufacturing	14.7	16.5	21.7	20.0

c. Real value added per labour (RVL)

ISIC	Industry	1997	1998	1999	2000
31	Food and tobacco products	22.8	18.2	18.3	18.9
32	Textile, garment and leathers	8.2	36.5	17.8	18.0
33	Wood products, incl. Furniture	7.9	53.5	27.3	28.4
34	Paper and paper products	9.0	32.7	27.2	32.8
35	Chemical, rubber and plastics	34.4	15.2	46.3	53.8
36	Non-metallic mineral products	30.5	17.2	9.8	43.1
37	Basic metal industries	17.3	-72.6	-67.0	-61.2
38	Machinery and equipment	2.9	4.9	-5.2	48.2
39	Other manufacturing	21.9	60.0	18.2	27.3

d. Price-cost margin (PCM)

ISIC	Industry	1997	1998	1999	2000
31	Food and tobacco products	3.7	-4.2	5.0	-4.4
32	Textile, garment and leathers	-0.7	3.0	4.0	4.1
33	Wood products, incl. Furniture	0.3	-1.8	1.9	-1.8
34	Paper and paper products	15.9	2.5	9.8	-4.3
35	Chemical, rubber and plastics	0.4	-13.3	3.0	8.2
36	Non-metallic mineral products	5.7	9.1	7.4	10.2
37	Basic metal industries	17.7	-52.9	-40.8	-38.3
38	Machinery and equipment	10.9	2.5	-0.4	11.4
39	Other manufacturing	3.8	16.6	0.8	0.5

Finally, the tables show a declining performance over the period 1998-2000 in wood and paper products industries (ISIC 33 and 34). This is in contrast with the tendency towards improving performance in other industries. Another key observation is that recovery was dramatic in the chemical and machinery industries (ISIC 35 and 38). Outputs of these industries were already 50 to 60 per cent above their pre-crisis level in 1999 and 2000.

What do these observations tell us? At least three points stand out. First, industries which are export-oriented seem to have benefited from the crisis. This is clearly shown by the positive performance of textile-garment and wood industries. As indicated by the table in Appendix 6.1, pre-crisis export intensity of these industries is higher than others. This point is also supported by the declining performance of the wood industry in 2000. As described in Chapter 3, the exchange rate appreciated in 2000, which meant that firms in this industry were no longer able to gain from the exchange rate depreciation compared to the peak of the crisis.

Second, factor intensity seems to have been important in shaping the impact of the crisis. The industries which benefited from the crisis are relatively labour- and natural-resource intensive industries. Meanwhile, the sectors that were severely affected by the crisis (basic metal and machinery) are the capital-intensive industries. The adverse impact on these industries, however, might also have been contributed to by their large use of imported inputs. Appendix 6.1 shows that the share of imported inputs used in total input of these industries is large compared to the others. The importance of imported input might explain the slow recovery in textile-garments and paper industries, as the share in these sectors is also relatively large.

Finally, the observations suggest that foreign ownership might have influenced the recovery trajectory. This is demonstrated by the fact that the two industries which dramatically increased output in 2000 (chemical and machinery) are those with high a share of foreign ownership (32 and 35 per cent respectively, see Appendix 6.1). According to Thee (2000) and Feridhanusetyawan et al. (2000), foreign ownership played a key role by facilitating sales redirection to exports in automotive and automotive-component industries (two major sectors within the broad machinery group). The percentage of cars exported increased from 1.4 per cent in 1997 to 15 per cent in 1998 (Thee 2000, p.432).

6.3.2.2 Plant-level data

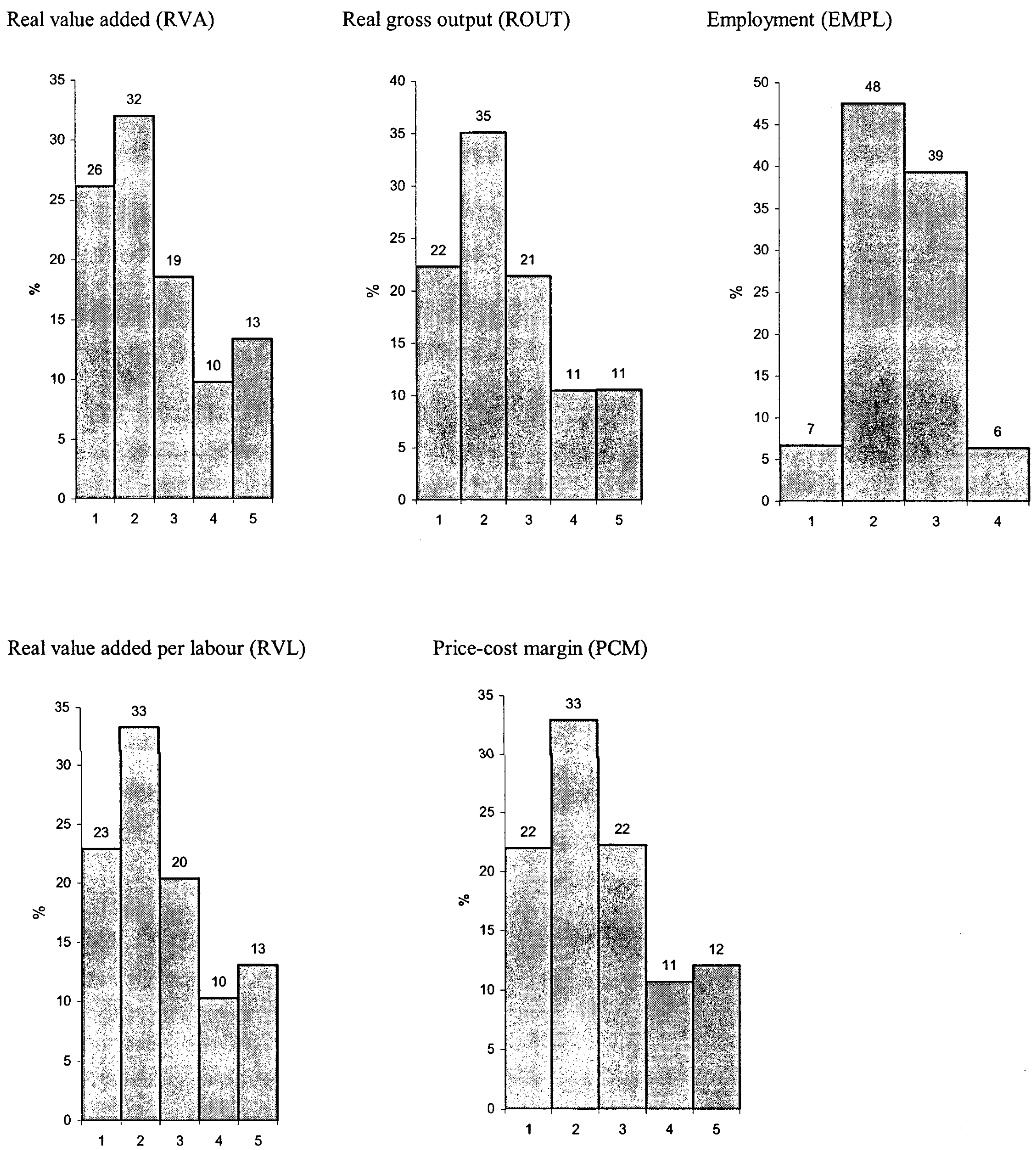
Examining the data at industry-level, the previous sub-section shows that the crisis unevenly affected industries' performance. What about the picture at plant-level? Is the performance impact of the crisis evenly distributed across the plants?

To answer this question, we examine the frequency distribution of the percentage difference in performance using the formula in 6.1. For plant *i*, this formula is

$$\%\Delta y_{i,t} = \frac{y_{i,t} - \overline{y}_{i,9596}}{\overline{y}_{i,9596}} \times 100$$

Figures 6.2 and 6.3 present the frequency distribution of the difference for the peak of the crisis and the early recovery periods, defined in this chapter as 1998 and the period 1999-2000, respectively. For the peak of the crisis, the definition excludes 1997 since it creates an ambiguity in the results. As noted, this is most likely because the crisis only began in the last quarter of 1997. Figure 6.2 confirms the uneven impact of the crisis was not only felt at industry-level, but also at plant-level. It was evident in all performance variables. Moreover, the variation is evidently very large. While slightly above 50 per cent of plants in the sample recorded a performance contraction, about 10 to 12 per cent recorded an extremely positive performance, as the percentage differences with respect to all performance variables (except employment) exceed 100 per cent. The variation persists in the early recovery period (Figure 6.3), indicating that while some plants were recovering, others were still suffering from the crisis.

Figure 6.2 Frequency distribution of $\%\Delta y_{i,t}$, peak of the crisis (the difference for t = 1998)



Note: Classes of the frequency distribution:

1 = $-100<\%\Delta y_{i,t}<-50$

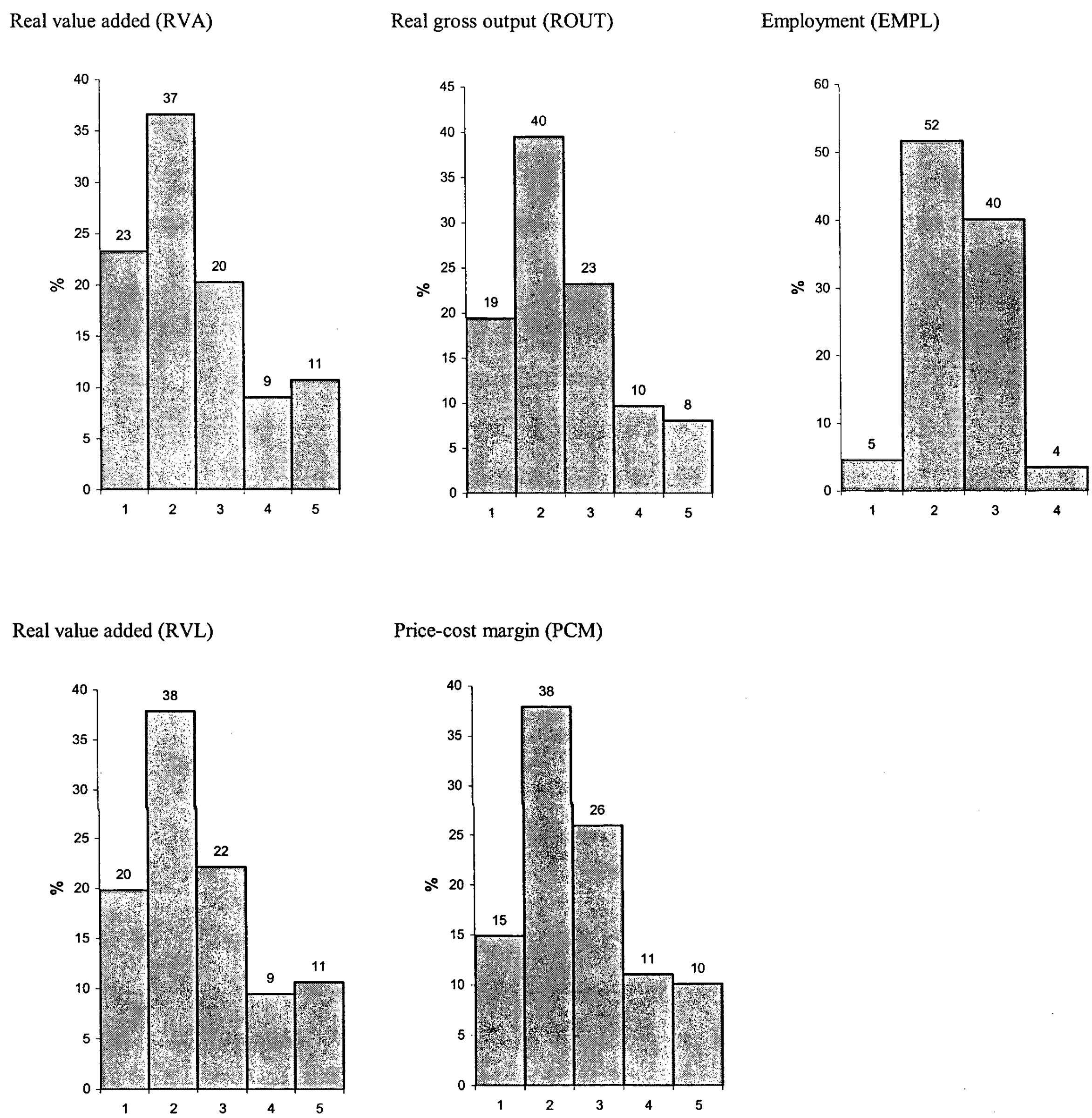
2 = $-50<\%\Delta y_{i,t}<0$

3 = $0<\%\Delta y_{i,t}<50$

4 = $50<\%\Delta y_{i,t}<100$

5 = $\%\Delta y_{i,t}>100$

Figure 6.3 Frequency distribution of $\%\Delta y_{i,t}$, early recovery (average of the difference for t = 1999 and 2000)



Note: Classes of the frequency distribution:

1 = $-100<\%\Delta y_{i,t}<-50$

2 = $-50<\%\Delta y_{i,t}<0$

3 = $0<\%\Delta y_{i,t}<50$

4 = $50<\%\Delta y_{i,t}<100$

5 = $\%\Delta y_{i,t}>100$

The variation persisted even at the more disaggregated level of industry. At the two-digit level (Table 6.3), a significant number of plants experienced performance contraction, even in the industries which were earlier shown to be better off during this period (i.e. textile and garments, wood and paper). This contraction is observed for all performance variables. Similarly, of the industries which were severely affected by the crisis (i.e. basic metal and machinery), about 30 to 40 per cent of their plants improved performance. The persistent variation can also be observed at the four-digit level, presented in Appendix 6.2.[6] The appendix shows that, in almost all major industries in Indonesian manufacturing, at least 60 per cent of plants experienced a contraction in performance during the peak of the crisis. Only a few industries (ISIC 3115, 3321 and 3411) recorded the percentage number of contracting plants at below 50 per cent, in respect to some of the performance indicators.

Table 6.3 and Appendix 6.2 indicate that the differences in industry, suggested earlier by Table 6.2, might not be the only factor determining the variation. To illustrate, even in the wood industry, which performed extremely well during the peak of the crisis, about 40 to 50 per cent of plants contracted (Table 6.3). Moreover, within the textile and garment, and food and beverages industries, substantial variations in the form of the distribution are still observed (Appendix 6.2). The empirical investigation into the factors that determine this variation is the subject of the next chapter.

[6] Appendix 6.2 only gives the major industry at the four-digit level, defined here as an industry where its plants are at least 5 per cent of the total plants in manufacturing.

Table 6.3 Relative frequency distribution of the performance difference by major industry group

a) Peak of the crisis (the difference for t=1998)

Performance indicators	Real value added (RVA)		Real gross output (ROUT)		Employment EMPL		Real value added per labour (RVL)		Price-cost margin (PCM)	
Status	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded
ISIC/Industry										
31 Food and beverage	63.7	36.3	59.4	40.6	60.3	39.7	63.9	36.1	56.3	43.7
32 Textile and garments	59.4	40.6	57.8	42.2	63.0	37.0	56.4	43.6	51.6	48.4
33 Wood products	44.1	55.9	41.7	58.3	54.9	45.1	41.4	58.6	53.0	47.0
34 Paper products	70.0	30.0	70.9	29.1	63.1	36.9	66.1	33.9	57.4	42.6
35 Chemical, rubber and plastics	61.8	38.2	66.0	34.0	60.8	39.2	60.0	40.0	54.6	45.4
36 Non-metallic mineral products	60.2	39.8	60.2	39.8	64.1	35.9	57.7	42.3	57.5	42.5
37 Basic metal industries	71.6	28.4	85.1	14.9	73.3	26.7	68.4	31.6	45.2	54.8
38 Machinery and transport equipment	65.1	34.9	67.6	32.4	70.2	29.8	59.5	40.5	57.8	42.2
39 Other manufacturing	56.8	43.2	54.3	45.7	58.3	41.7	56.1	43.9	56.0	44.0

b) Early recovery period (average of the difference for t=1999 and 2000)

Performance indicators	Real value added (RVA)		Real gross output (ROUT)		Employment EMPL		Real value added per labour (RVL)		Price-cost margin (PCM)	
Status	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded
ISIC/Industry										
31 Food and beverage	64.7	35.3	62.1	37.9	59.1	40.9	64.3	35.7	57.9	42.1
32 Textile and garments	55.8	44.2	55.7	44.3	60.9	39.1	52.6	47.4	54.7	45.3
33 Wood products	49.6	50.4	47.0	53.0	58.7	41.3	48.2	51.8	58.0	42.0
34 Paper products	69.4	30.6	68.3	31.7	62.3	37.7	67.8	32.2	59.0	41.0
35 Chemical, rubber and plastics	54.4	45.6	55.0	45.0	58.4	41.6	53.5	46.5	55.5	44.5
36 Non-metallic mineral products	55.8	44.2	56.2	43.8	65.1	34.9	51.5	48.5	52.2	47.8
37 Basic metal industries	66.0	34.0	73.4	26.6	64.6	35.4	68.3	31.7	60.0	40.0
38 Machinery and transport equipment	58.7	41.3	60.7	39.3	67.2	32.8	56.0	44.0	56.5	43.5
39 Other manufacturing	55.2	44.8	55.3	44.7	60.5	39.5	51.4	48.6	57.5	42.5

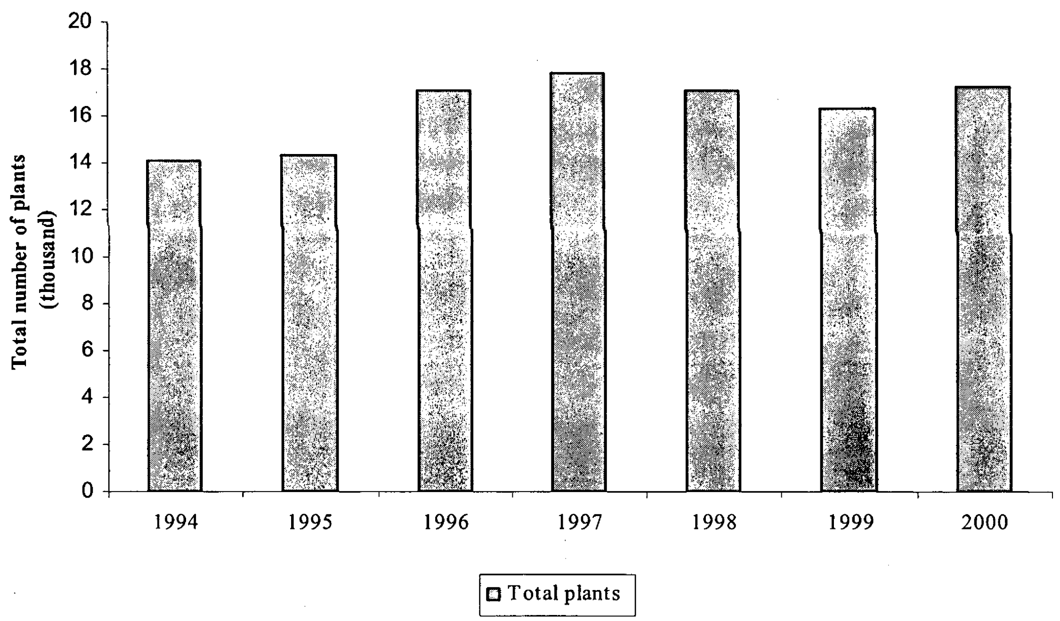
Source: Author's computation.

6.4 The impact of the crisis on firms demographics

The previous section has examined the data to gauge some facts about the crisis impact on industry performance. This section extends the analysis to examine the crisis impact on firms demographics. As noted in Chapter 4, there are few studies of this subject for Indonesia (e.g. Thee 2000).

Figure 6.4 shows the trend in the number of plants in the industry between 1993 and 2000. The figure does not suggest that the crisis severely affected firms demographics. Unlike its impact on the industry output, the crisis did not seem to affect the number of firms in the sector. The number of plants declined by about four per cent in 1998, which is only a modest decline compared to about 12 per cent contraction in output.

Figure 6.4 Number of plants in Indonesian manufacturing



Source: annual manufacturing surveys, BPS.

Although useful, focusing only on Figure 6.4 to assess the crisis impact on firms demographics might mask the detail of the impact. Therefore, the examination needs to be extended to several other demographic variables. We begin here with the rates of firm entry and exit. As commonly adopted in other research, this study defines entry and exit rates in terms of the number of plants and employment. Entry and exit rates in terms of number of plants are labelled as $EN1$ and $EX1$, while entry and exit rates in terms of employment are labelled as $EN2$ and $EX2$.

$EN1$ and $EX1$ for industry j between t and $t-1$ are defined as

$$EN1_{j,t} = \frac{NEP_{j,t}}{NTP_{j,t-1}} ,$$

$$EX1_{j,t} = \frac{NXP_{j,t}}{NTP_{j,t-1}} ,$$

where: $NEP_{j,t}$ = total number of plants that enter industry j between t and $t-1$

$NXP_{j,t}$ = total number of plants that exit industry j between t and $t-1$

$NTP_{j,t-1}$ = total number of plants in industry j in year $t-1$

EN2 and *EX2* for industry *j* between t and *t*-1 are defined as

$$EN2_{j,t} = \frac{EMPL\_EN_{j,t}}{EMPL\_T_{j,t-1}} ,$$

$$EX2_{j,t} = \frac{EMPL\_EX_{j,t}}{EMPL\_T_{j,t-1}} ,$$

where: $EMPL\_EN_{j,t}$ = total employment of plants that enter industry j between t and $t-1$

$EMPL\_EX_{j,t}$ = total employment of plants that exit industry between t and $t-1$

$EMPL\_T_{j,t-1}$ = total employment of plants in industry j in $t-1$

There are different types of entry and exit. Within the entry category, entry can occur through acquisition of the established production units or creation of new ones (greenfield entry). Within the exit category, exit can occur through divestiture or closing down of production units. There is a substantial difference in the effect of these types of entry and exit. A greenfield entry and closing down (i.e. exit) affect industry's supply directly and immediately, while it is not clear whether or not the effects of acquisition entry and divestiture exit are immediate (Baldwin 1998). This difference ideally leads to separation of the analysis according to each type of entry and exit. The separation, however, cannot be done. As described in Chapter 5, information needed (i.e. the reasons for firms entry and exit) is unavailable. Consequently, this study assumes that the entry and exit are greenfiield entry and closed-down exit, respectively.

Figure 6.5 and 6.6 show the trend of entry and exit rates in terms of the number of plants and employment, respectively. The figures clearly show the dramatic impact the crisis had on the extent to which firms are created and destroyed. Consider, first, the impact on the creation of firms. Figure 6.5 shows that entry rates during the period 1997-2000 fall to about half of that during the period 1993-96 (pre-crisis). The trend of the rates in terms of employment also reveals a similar picture (Figure 6.6), although the magnitude of the decline is slightly lower. Another key observation is that the rate of establishment of firms did not seem to have recovered in 2000. This is in contrast to the observation in the previous section where, in terms of performance, the industry appeared to have recovered in this year.

Turning to the impact on the closure of firms, Figure 6.5 shows that the exit rates increased during the peak of the crisis. This suggests that the crisis put some firms into receivership, bearing in mind that this inference is likely to be overstated as the data do not include the reasons for the plants' disappearance. This negative impact, however, seems to have disappeared during the period 1999-2000. The exit rates return to the pre-crisis level and, in fact, move further down to slightly below that level. Unlike the trend in the entry rates, the trend in the exit rates is consistent with the general impression of the industry's early recovery. Therefore, the earlier observation of the entry rates (during the period 1999-2000) suggests that most of the recovery in performance must have originated from firms that survived the crisis.

Figure 6.5 Entry and exit rates in Indonesian manufacturing in terms of number of plants (EN1 and EX1) (%), 1994-2000

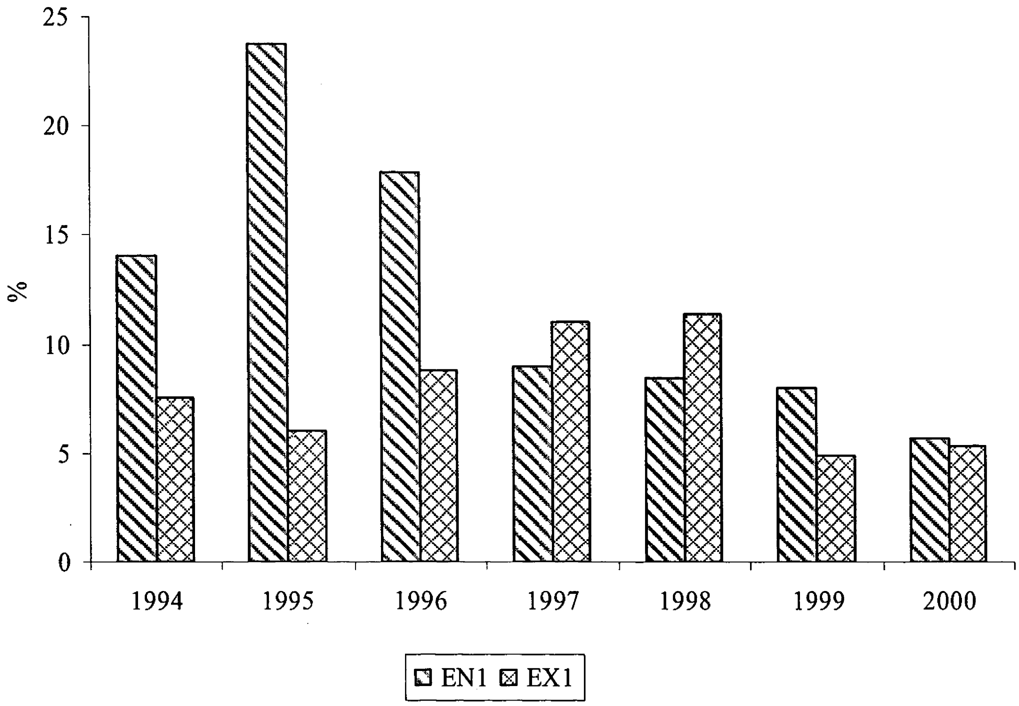
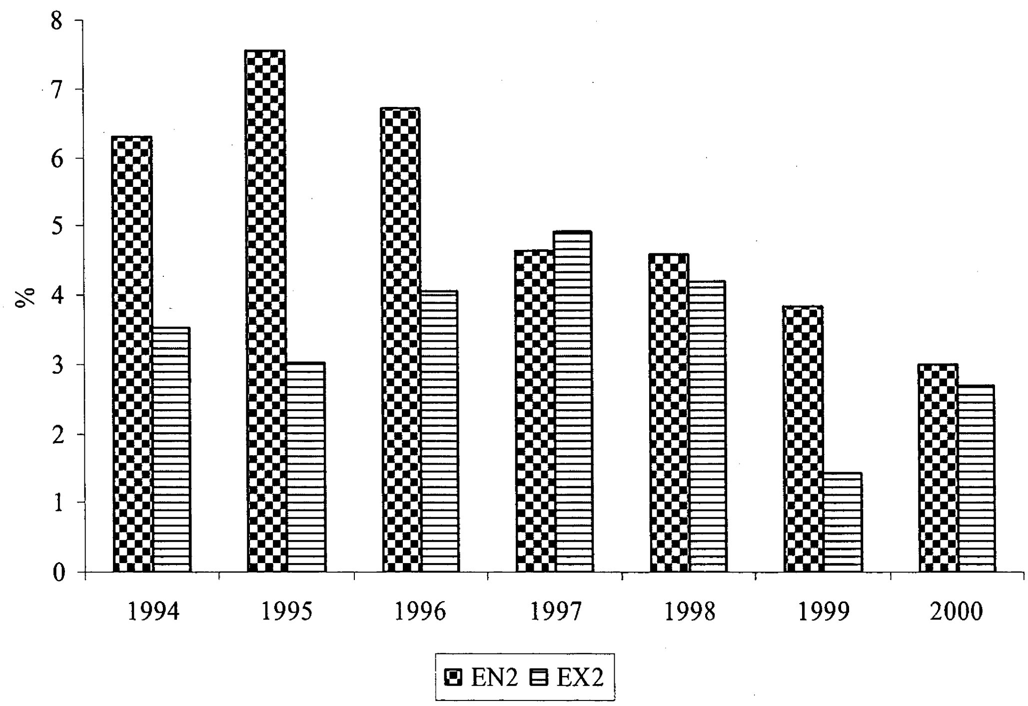


Figure 6.6 Entry and exit rates in Indonesian manufacturing in terms of employment (EN2 and EX2) (%), 1994-2000



The continuously declining pattern in the entry rates can also be observed across the broad industry groups. This is shown in Table 6.4 which presents the entry rates and the percentage difference in the rates between the crisis and pre-crisis periods by two-digit industries. Across the industries, the percentage differences in the rates for 2000 are lower than those for the period 1998-99 (see columns 8 to 10 on the table).

Another important observation from Table 6.4 is that, although the entry rates between 1997 and 2000 declined in all industry groups, the extent of the declines are different between industries. These differences are demonstrated more clearly at the three-digit industry level (provided in Appendix 6.3). Within the textile-garments industry, for example, the differences in entry rates in terms of employment (EN2) in 1998 range from -50 per cent in leather (ISIC 323) to -88 per cent in footwear (ISIC 324) industries. It is worth noting here that, to a large extent, the decline in these industries, particularly in footwear, might have reflected the decline in export orders, as importers were concerned that firms would not be able to deliver products on time (Booth 1999). Still in terms of employment, Appendix 6.3 also shows the extent of firm entry a few industries, i.e., transport equipment (ISIC 384) and porcelain (ISIC 361), were in fact higher during the period 1998-99. This indicates that business opportunities in some industries might have been more favourable during the crisis.

Overall, the observations on entry rates suggest that the behaviour of firm entry during the crisis was significantly different to that before the crisis. More importantly, it did not seem to recover as seen in other performance measures. One possible explanation, of course, is the recovery might have come with a lag, probably because business confidence had not completely recovered in 2000. Nevertheless, the different behaviour might also signal that the factors which govern entry might have changed after the crisis. Empirical studies on firm entry (e.g. Highfield and Smiley 1987; Yamawaki 1991) have found that determinants of firm entry are sensitive to changes in business cycles. An attempt to shed some light on this issue is carried out in Chapter 10.

Table 6.4 Entry rates by major industry group (%), 1994-2000

a. In terms of number of plants (EN1)

	Entry rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
31 Food and tobacco products	12.3	5.9	4.9	4.6	4.4	-52	-60	-62	-64
32 Textile, garment and leathers	19.1	7.7	6.3	6.4	4.2	-60	-67	-67	-78
33 Wood products, incl. Furniture	27.7	10.4	13.9	12.3	11.7	-63	-50	-56	-58
34 Paper and paper products	17.9	8.2	8.6	4.1	2.4	-54	-52	-77	-86
35 Chemical, rubber and plastics	11.4	6.8	7.0	5.2	2.2	-40	-39	-54	-81
36 Non-metallic mineral products	22.8	9.1	8.8	6.1	4.3	-60	-61	-73	-81
37 Basic metal industries	15.2	11.7	10.4	3.1	1.6	-23	-32	-80	-89
38 Machinery and equipment	15.9	7.0	10.5	4.8	2.6	-56	-34	-70	-84
39 Other manufacturing	21.4	7.3	14.6	8.6	4.2	-66	-32	-60	-80

b. In terms of number of plants (EN2)

	Entry rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
31 Food and tobacco products	6.0	5.5	2.4	2.10	2.2	-9	-61	-65	-63
32 Textile, garment and leathers	8.8	4.8	2.8	3.22	2.5	-45	-68	-63	-71
33 Wood products, incl. Furniture	16.1	5.7	8.7	9.69	3.8	-64	-46	-40	-76
34 Paper and paper products	13.9	7.0	3.4	1.40	1.2	-50	-75	-90	-91
35 Chemical, rubber and plastics	5.3	3.1	3.9	1.72	1.5	-41	-27	-67	-71
36 Non-metallic mineral products	12.5	6.0	3.9	3.59	1.8	-52	-69	-71	-85
37 Basic metal industries	4.6	7.8	2.3	1.12	0.3	72	-49	-75	-93
38 Machinery and equipment	8.0	3.9	6.4	2.57	1.2	-51	-19	-68	-84
39 Other manufacturing	7.9	5.4	6.6	4.78	1.6	-31	-16	-39	-80

Note: See text for the definition of EN1 and EN2.

Table 6.5 presents the exit rates and their percentage difference between the crisis and pre-crisis period by the two-digit industry group. The table reveals that large increases in the rates during the period 1997-98 occurred in capital-intensive industries – non-metallic minerals, basic metal and machinery – suggesting that factor intensity might have been important in shaping the firm survival during this time. This observation is consistent with the general picture portrayed in the previous section (see Table 6.2). However, it is important to note that, in basic metal and machinery, the increase in terms of number of plants (EN1) is substantially different to that in terms of employment (EN2). Therefore, it suggests that most of the exited plants were small and large firms survived better, at least in these industries.

Table 6.5 Exit rates by major industry group (%), 1994-2000

a. In terms of number of plants (EX1)

	Exit rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
31 Food and beverage	7.1	8.1	6.3	3.7	4.4	14	-11	-47	-37
32 Textile and garments	7.9	12.5	11.4	4.3	6.4	59	44	-45	-18
33 Wood products	12.8	15.8	10.9	9.8	8.0	24	-14	-24	-38
34 Paper products	4.9	9.1	7.0	3.8	3.3	86	43	-22	-33
35 Chemical, rubber and plastics	6.1	7.0	8.0	2.4	3.2	14	30	-61	-47
36 Non-metallic mineral products	6.1	12.6	12.2	4.9	2.3	108	100	-20	-62
37 Basic metal industries	4.1	4.7	9.9	3.1	5.3	14	142	-25	30
38 Machinery and transport equipment	5.9	9.5	17.3	2.1	4.5	62	194	-65	-24
39 Other manufacturing	6.2	12.1	12.1	5.5	5.1	97	96	-11	-18

a. In terms of employment (EX2)

	Exit rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
31 Food and beverage	3.6	3.7	3.4	1.7	2.4	5	-4	-52	-33
32 Textile and garments	3.6	5.6	3.9	1.5	3.3	57	11	-58	-6
33 Wood products	9.6	9.1	4.5	5.5	9.2	-4	-53	-43	-3
34 Paper products	2.0	4.2	2.7	1.3	1.0	113	39	-33	-49
35 Chemical, rubber and plastics	2.8	2.7	3.2	0.4	1.2	-5	13	-85	-58
36 Non-metallic mineral products	2.9	6.7	8.1	2.4	1.1	130	177	-18	-61
37 Basic metal industries	1.5	1.1	2.1	1.7	1.5	-26	38	9	-4
38 Machinery and transport equipment	4.6	5.1	8.6	0.6	1.8	10	85	-87	-60
39 Other manufacturing	3.7	7.0	4.2	0.9	2.9	88	11	-75	-22

Note: See text for the definition of EX1 and EX2.

As defined, EN2 and EX2 reflect the industry's adjustment in employment originated from the entering and exiting firms. The adjustment obviously does not only come from these firms, but also from incumbents. Computing employment change for the group of incumbents can provide a picture of how the crisis affected the extent of the incumbents' expansion and contraction. To proceed, we define the rate of expansion (POS) in industry j at time t as

$$POS_{j,t} = \frac{EMPL\_POS_{j,t}}{EMPL\_T_{j,t-1}}$$

and the rate of contraction (NEG) in industry j at time t as

$$NEG_{j,t} = \left| \frac{EMPL\_NEG_{j,t}}{EMPL\_T_{j,t-1}} \right| ,$$

where: $EMPL\_POS_{j,t}$ = total employment of plants that expand between t and t-1

$EMPL\_NEG_{j,t}$ = total employment of plants that contract between t and t-1

A simple relationship that links EN2, EX2, POS and NEG is the following:

$$EMPL\_GROWTH_{j,t} = EN2_{j,t} + POS_{j,t} + EX2_{j,t} + NEG_{j,t} \qquad (6.2)$$

where $EMPL\_GROWTH_{j,t}$ is the annual employment growth between t and t-1.[7] In other words, 6.2 decomposes the annual employment change into the component associated with "growing-and-new" and "shrinking-and-exiting firms".

[7] Equation 6.2 and the definition of POS and NEG follow those devised in Davis et al. (1996).

Figure 6.7 Expansion (POS) and contraction (NEG) rates (%), 1994-2000

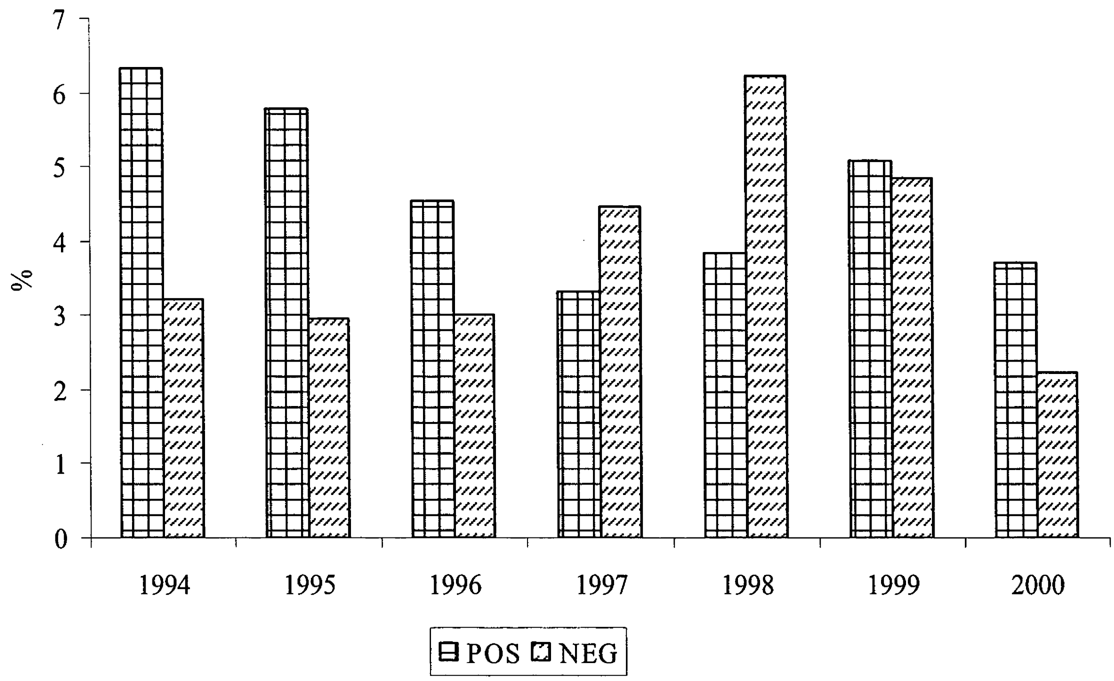
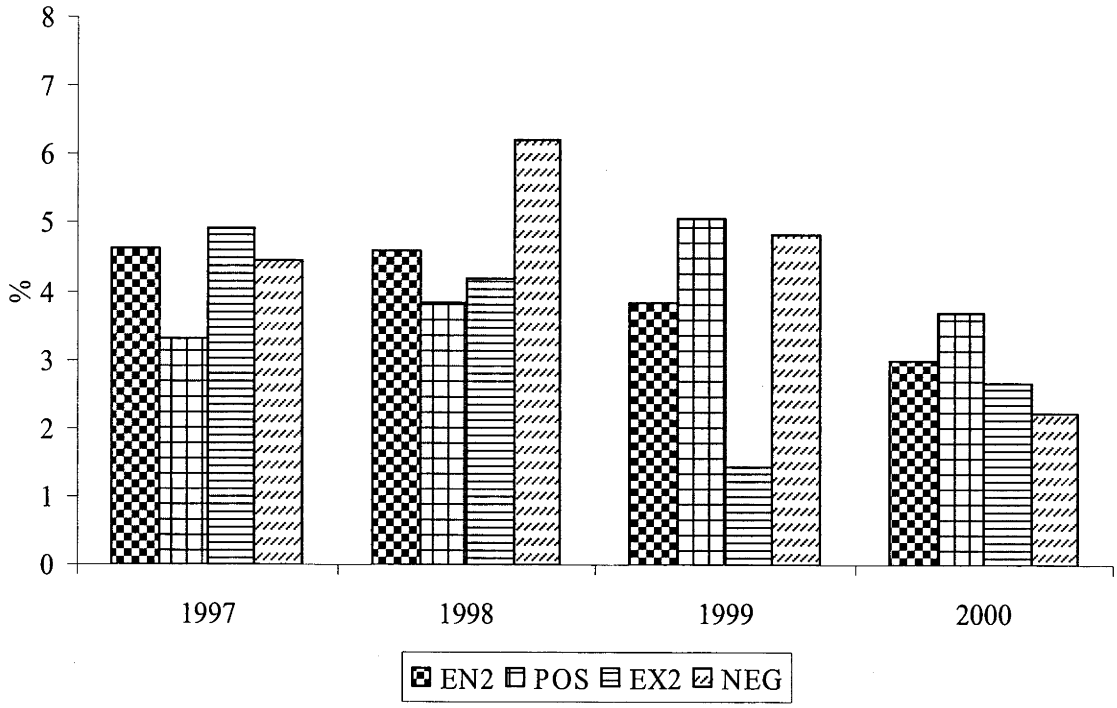


Figure 6.7 shows the trend in the expansion and contraction rates for the period 1993-2000. Consider, first, the expansion rate. The figure shows that it declined significantly in 1997 and 1998 but recovered immediately in the following year. This observation is in contrast to the continuously declining trend of the entry rates demonstrated earlier, but supports the inference that much of the industry's recovery in performance was contributed to by firms that survived the crisis. As for the contraction rates, the figure shows how dramatic the adjustment made by the incumbents was. The rate in 1998 jumped to about double its average pre-crisis level. Consistent with the view of recovery, the rate started to decline in 1999 and even in 2000 reached the average pre-crisis level.

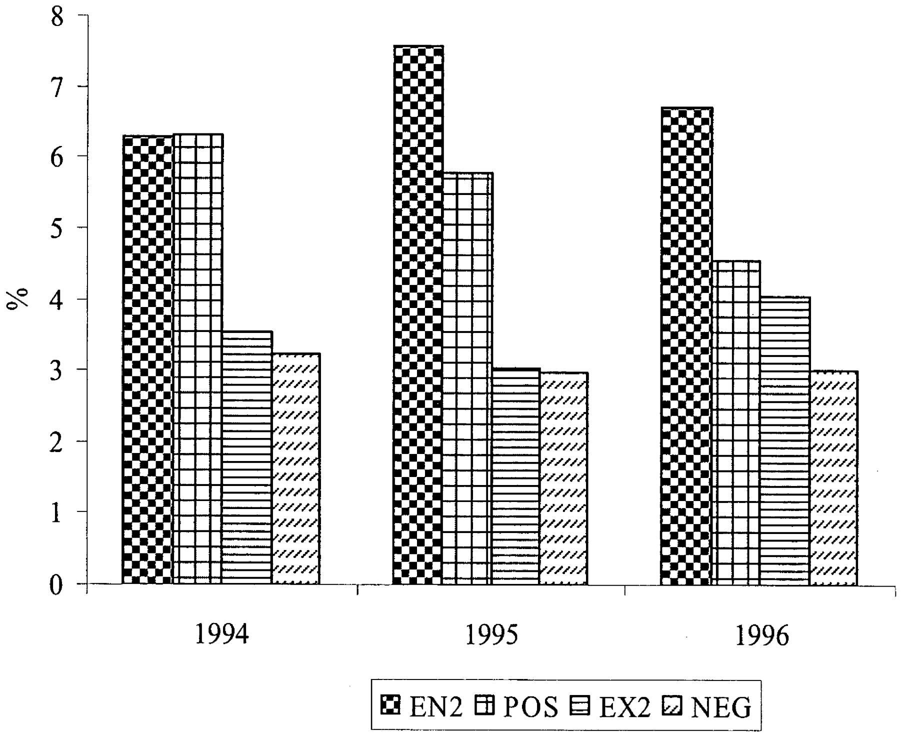
Figures 6.8a and 6.8b decompose the annual employment change for the period 1994-2000, by putting together EN2, POS, EX2 and NEG. The key observation from the figure is that the aggregate annual employment contraction in 1998 and 1999 was dominated by employment contraction from the incumbents, rather than from those which exited the industry (see Figure 6.8b). This indicates a high survival rate of firms in weathering the crisis, as they tend to reduce employment before declaring bankruptcy. It is also in contrast to the pre-crisis pattern. As shown in Figure 6.8a, employment destruction in this period was almost evenly divided between that originating from incumbents and the exiting plants.

Figure 6.8 Decomposition of employment growth (%), 1994-2000

a. 1994-96



b. 1997-2000



However, the more dominant contraction by incumbents in the crisis period seems to apply only to firms in some groups of industries. This is shown in Table 6.6 which presents the decomposition for the period 1997-2000 at the two-digit industry level. The contraction from incumbents dominates in the paper, chemical, basic metal and machinery industries (ISIC 34, 35, 37 and 38). These industries are characterised by being capital-intensive and having a high share of imported inputs (see Appendix 6.1). Again, this observation suggests that factor intensity and the share of imported inputs might have been important in shaping the diverse impact of the crisis on firms.

It is worth noting that expansion rates in 1999 are significantly higher than those of 1998 in several industries: textiles and garments, non-metallic minerals, basic metals and machinery. The rates translated to the picture of the immediate employment recovery as depicted in Figure 6.1. While it is too early at this stage to draw some inferences, examining a few pre-crisis industry characteristics (Appendix 6.1) suggests that foreign ownership might have been important in explaining this observation. The share of foreign ownership in these industries is at least about the industry-wide average.

Table 6.6 Decomposition of employment growth (%) by major industry groups, 1997-2000

ISIC/Industry	Year	Entry rate (EN2)	Expansion rate (POS)	Exit rate (EX2)	Contraction rate (NEG)
31 Food and beverage	1997	5.48	3.16	3.74	4.06
	1998	2.35	4.85	3.41	5.23
	1999	2.10	4.44	1.69	4.94
	2000	2.24	3.52	2.38	2.92
32 Textile and garments	1997	4.84	3.26	5.58	4.81
	1998	2.81	3.54	3.93	5.69
	1999	3.22	5.78	1.51	3.74
	2000	2.53	4.40	3.33	1.80
33 Wood products	1997	5.75	3.17	9.14	4.13
	1998	8.68	4.46	4.50	5.99
	1999	9.69	4.49	5.47	6.05
	2000	3.84	3.66	9.24	2.88
34 Paper products	1997	7.00	2.88	4.17	4.30
	1998	3.43	3.01	2.71	7.01
	1999	1.40	4.06	1.30	5.47
	2000	1.20	2.34	1.00	2.57
35 Chemical, rubber and plastics	1997	3.14	3.36	2.71	4.96
	1998	3.87	3.89	3.21	4.89
	1999	1.72	4.89	0.44	5.14
	2000	1.55	3.67	1.20	3.34
36 Non-metallic products	1997	5.98	3.30	6.69	4.16
	1998	3.91	2.16	8.08	7.82
	1999	3.59	4.92	2.40	4.68
	2000	1.84	2.49	1.13	2.00
37 Basic metal	1997	7.84	1.29	1.13	3.94
	1998	2.32	1.98	2.11	8.29
	1999	1.12	5.37	1.67	5.10
	2000	0.33	2.63	1.47	1.09
38 Machinery and transport equipment	1997	3.93	4.05	5.08	4.63
	1998	6.43	2.87	8.55	9.99
	1999	2.57	6.00	0.62	5.41
	2000	1.25	3.43	1.84	1.89
39 Other manufacturing	1997	5.45	4.17	7.02	2.69
	1998	6.61	6.37	4.17	4.34
	1999	4.78	3.44	0.94	6.38
	2000	1.57	2.26	2.91	2.43

Note: See text for the definition of EN1, POS, EX2 and NEG

6.5 Summary

The purpose of this chapter has been to derive some basic facts about how the crisis affected the Indonesian manufacturing industry. This provides the basis for the empirical analysis in the next three chapters.

The crisis severely affected the industry. After the strong pre-crisis growth, the industry contracted significantly in 1998. However, almost immediately it began to recover. All the performance measures reached the pre-crisis (1995-96) level in 2000.

The results show large variations in performance across industries. While some contracted, others expanded. This variation can also be observed during the early recovery. Despite the general trend of improvement, the magnitude of the recovery was dramatic in several industries. The results suggest that some characteristics at the industry level – namely sales orientation, factor intensity, the share of imported inputs and foreign ownership – might have been the determining variables generating these variations.

Examining the data at the plant-level indicates a large variation in the performance impact across firms, even within the industries which were expanded during the crisis. This observation suggests that the differences across industries, or their characteristics, as suggested earlier might not be the only factors explaining the variation.

This chapter also shows that the crisis severely affected the demographics of plants. Entry rates declined significantly in 1998 but, unlike the trend in the performance measures, they did not seem to recover in 2000. Exit rates increased to almost double the pre-crisis level during the peak of the crisis but recovered immediately. The results revealed that firms were resilient during the crisis. Most of the employment contraction in 1998 and 1999 was dominated by the contraction from incumbents, rather than from exited plants. As with the earlier analysis, the analysis of plants demographics suggests that some industry and firm characteristics were crucial in determining the diversity of the plant-level responses. It is to this issue that we now turn.

Appendix 6.1 Selected characteristics of Indonesian manufacturing by broad industry group

ISIC/Industry	Export Intensity (% of industry value added)	Share of imported input (% of total intermediate input)	Share of foreign ownership (% of value added)
31 Food and beverage	22.2	8.9	10.4
32 Textile and garments	43.8	38.2	22.6
33 Wood products	70.0	2.3	11.0
34 Paper products	14.8	33.3	27.4
35 Chemical, rubber and plastics	21.9	37.4	32.8
36 Non-metallic mineral products	11.5	26.0	19.9
37 Basic metal industries	13.7	62.0	28.6
38 Machinery and transport equipment	17.3	53.2	35.2
39 Other manufacturing	52.4	38.9	54.1

Source: Author's computation.

Appendix 6.2 Performance indicators of some major industries, at four-digit ISIC level, peak of the crisis (t=1998)

	Relative frequency distribution of the performance difference (%)									
Performance indicators	Real value added (RVA)		Real gross output (ROUT)		Employment EMPL		Real value added per labour (RVL)		Price-cost margin (PCM)	
ISIC	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded
31 Food and beverage										
3114 Preserved and processed fish products	62.6	37.4	50.3	49.7	66.5	33.5	63.7	36.3	60.2	39.8
3115 Manufacture of vegetable oils	46.2	53.8	47.2	52.8	59.3	40.7	50.0	50.0	45.5	54.5
3116 Grain mill products	71.3	28.7	65.0	35.0	61.5	38.5	72.6	27.4	57.1	42.9
3117 Manufacture of bakery products	72.3	27.7	60.3	39.7	60.0	40.0	69.9	30.1	62.3	37.7
3141 Tobacco manufactures	70.7	29.3	69.7	30.3	58.8	41.2	69.3	30.7	52.0	48.0
32 Textile and garments										
3211 Spinning, weaving and finishing textiles	62.7	37.3	61.1	38.9	67.0	33.0	60.8	39.2	49.9	50.1
3212 Manufacture of made-up textile goods	60.2	39.8	56.7	43.3	65.3	34.7	56.0	44.0	52.4	47.6
3213 Knitting mills	66.2	33.8	68.5	31.5	57.6	42.4	63.4	36.6	57.1	42.9
3221 Manufacture of wearing apparel	57.7	42.3	53.2	46.8	59.7	40.3	54.3	45.7	53.1	46.9
3241 Manufacture of footwear	58.2	41.8	63.8	36.2	63.9	36.1	54.7	45.3	50.2	49.8
33 Wood products										
3311 Sawmills, planing and other wood mills	50.0	50.0	47.9	52.1	56.8	43.2	49.1	50.9	52.1	47.9
3321 Manufacture of furniture and fixtures	36.8	63.2	33.6	66.4	51.5	48.5	32.3	67.7	52.2	47.8
34 Paper products										
3411 Pulp, paper and paperboard	50.5	49.5	55.1	44.9	54.4	45.6	52.0	48.0	50.0	50.0
3412 Paperboard and paper boxes	68.2	31.8	61.0	39.0	48.2	51.8	67.5	32.5	50.9	49.1
3420 Printing and publishing	75.5	24.5	78.0	22.0	68.7	31.3	70.1	29.9	60.9	39.1

Appendix 6.2 continued

Appendix 6.2 concluded

	Relative frequency distribution of the performance difference (%)									
Performance indicators	Real value added (RVA)		Real gross output (ROUT)		Employment EMPL		Real value added per labour (RVL)		Price-cost margin (PCM)	
ISIC	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded	contracted	expanded
35 Chemical, rubber and plastics										
3511 Basic industrial chemicals except fertilizers	49.7	50.3	55.1	44.9	58.8	41.2	52.5	47.5	51.5	48.5
3521 Paints, varnishes and lacquers	61.7	38.3	80.7	19.3	67.8	32.2	59.5	40.5	39.8	60.2
3552 Rubber products	61.8	38.2	60.7	39.3	56.8	43.2	56.1	43.9	57.3	42.7
3560 Plastic products not elsewhere classified	65.2	34.8	67.4	32.6	63.7	36.3	62.5	37.5	52.8	47.2
36 Non-metallic mineral products										
3632 Structural cement products	73.1	26.9	75.6	24.4	73.2	26.8	67.8	32.2	62.4	37.6
3642 Clay products	53.8	46.2	51.0	49.0	59.7	40.3	51.2	48.8	53.7	46.3
37 Basic metal industries										
3710 Iron and steel basic industries	65.7	34.3	88.2	11.8	70.6	29.4	63.1	36.9	44.1	55.9
3720 Non-ferrous metal basic industries	79.6	20.4	81.1	18.9	76.9	23.1	75.5	24.5	46.7	53.3
38 Machinery and transport equipment										
3811 Cutlery, hand tools and general hardware	46.4	53.6	34.4	65.6	63.5	36.5	45.0	55.0	56.6	43.4
3813 Structural metal products	61.9	38.1	73.3	26.7	77.4	22.6	57.1	42.9	55.0	45.0
3824 Special industrial machinery and equipment	71.3	28.8	67.1	32.9	74.0	26.0	70.9	29.1	70.8	29.2
3832 Radio, television and communication equipment	62.6	37.4	67.5	32.5	59.5	40.5	63.2	36.8	67.4	32.6
3843 Motor vehicles	99.2	0.8	99.2	0.8	77.3	22.7	99.0	1.0	52.3	47.7
3844 Motorcycles and bicycles	62.4	37.6	68.2	31.8	70.0	30.0	47.3	52.7	47.5	52.5

Source: Author's computation.

Appendix 6.3 Entry rates by three-digit industry (%), 1995-2000

a. In terms of number of plants (EN1)

	Entry rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
311 Food	13.2	6.7	6.3	4.6	4.5	-49	-52	-65	-66
312 Other food	13.3	6.5	5.1	7.1	2.8	-51	-61	-47	-79
313 Beverage	9.5	6.7	1.5	1.1	9.0	-30	-84	-89	-5
314 Tobacco products	11.4	3.1	4.5	3.7	3.2	-73	-60	-67	-72
321 Textile	13.5	6.6	3.5	7.3	4.1	-51	-74	-46	-69
322 Wearing apparel	30.9	8.1	11.3	6.3	6.3	-74	-63	-80	-80
323 Leather products	15.1	7.0	5.6	6.9	3.4	-53	-63	-54	-78
324 Footwear	25.3	11.5	9.0	2.9	2.1	-54	-64	-89	-92
331 Wood products	24.4	9.4	11.6	10.6	7.5	-62	-52	-56	-69
332 Furniture	34.5	12.5	18.5	15.6	20.2	-64	-46	-55	-41
341 Paper and paper products	18.0	8.8	10.2	4.1	2.1	-51	-43	-77	-88
342 Printing and publishing	17.8	6.6	3.6	4.3	3.3	-63	-80	-76	-81
351 Chemical products	16.5	7.1	9.0	7.9	1.4	-57	-46	-52	-91
352 Other chemical products	8.8	7.1	5.1	2.9	2.7	-20	-42	-68	-69
355 Rubber products	6.9	5.3	6.7	4.4	1.8	-24	-4	-36	-74
356 Plastics products	14.8	9.3	7.2	6.6	4.3	-37	-51	-55	-71
361 Porcelain	11.1	5.8	6.3	3.5	3.5	-48	-44	-68	-68
362 Glass and glass products	21.3	0.0	15.2	2.3	0.8	-100	-28	-89	-96
363 Cement	16.4	3.1	4.9	3.3	3.1	-81	-70	-80	-81
364 Clay products	43.0	11.7	6.8	16.3	12.0	-73	-84	-62	-72
369 Other non-metallic mineral products	21.4	17.7	10.1	5.8	3.2	-17	-53	-73	-85
371 Iron and steel products	14.8	12.6	9.2	3.6	1.9	-15	-38	-76	-87
372 Non ferrous metal products	15.6	10.8	11.5	2.5	1.3	-31	-26	-84	-92
381 Metal products	21.0	7.7	8.6	5.5	4.3	-64	-59	-74	-79
382 Non-electrical machinery	20.9	6.6	7.6	8.1	2.9	-68	-64	-61	-86
383 Electrical machinery	16.3	14.2	12.7	4.2	3.9	-13	-22	-75	-76
384 Transport equipment	7.9	4.1	13.5	3.0	1.3	-48	72	-62	-83
385 Profesional and scientific equipment	11.5	1.9	10.7	0.9	0.0	-84	-7	-92	-100
390 Other manufacturing	21.4	7.3	14.6	8.6	4.2	-66	-32	-60	-80

Appendix 6.3 continued

Appendix 6.3 concluded

b. In terms of number of plants (EN2)

	Entry rate					Percentage differences to the period 1995-96			
	1995-96	1997	1998	1999	2000	1997	1998	1999	2000
ISIC/Industry									
311 Food	6.1	5.1	3.1	1.5	3.1	-17	-50	-76	-49
312 Other food	7.8	2.6	2.9	3.8	1.6	-67	-63	-51	-79
313 Beverage	3.6	17.2	0.8	0.7	2.4	374	-78	-80	-33
314 Tobacco products	4.8	1.5	1.5	1.6	1.5	-69	-69	-67	-69
321 Textile	5.1	5.4	1.7	3.4	2.0	7	-67	-32	-60
322 Wearing apparel	9.9	5.6	4.7	2.3	5.9	-43	-53	-77	-40
323 Leather products	9.1	5.4	4.5	6.7	1.5	-41	-50	-27	-84
324 Footwear	20.1	1.2	2.3	0.4	0.2	-94	-88	-98	-99
331 Wood products	12.7	5.0	5.5	5.0	3.1	-60	-57	-60	-76
332 Furniture	23.0	7.2	15.1	19.0	5.4	-69	-35	-18	-77
341 Paper and paper products	15.7	8.4	4.2	1.0	0.9	-46	-73	-94	-94
342 Printing and publishing	8.2	2.7	1.2	2.6	2.1	-68	-86	-69	-75
351 Chemical products	8.0	1.7	3.0	2.9	0.7	-78	-63	-64	-92
352 Other chemical products	4.2	3.5	5.6	0.6	3.3	-17	32	-85	-23
355 Rubber products	2.8	3.6	2.5	1.1	0.4	28	-11	-62	-84
356 Plastics products	6.3	5.8	4.6	3.3	1.5	-8	-27	-47	-76
361 Porcelain	3.1	2.4	2.6	10.9	0.4	-21	-14	253	-86
362 Glass and glass products	10.0	0.0	5.2	3.7	0.2	-100	-48	-63	-98
363 Cement	12.0	3.1	3.2	2.2	2.1	-74	-73	-82	-83
364 Clay products	20.4	10.9	3.5	4.3	3.7	-46	-83	-79	-82
369 Other non-metallic mineral products	12.5	9.6	4.3	2.4	1.9	-23	-65	-80	-85
371 Iron and steel products	4.4	2.3	1.8	1.0	0.5	-48	-59	-76	-89
372 Non ferrous metal products	4.7	13.4	2.8	1.2	0.2	183	-40	-75	-96
381 Metal products	7.9	3.9	3.6	2.8	2.7	-50	-54	-65	-66
382 Non-electrical machinery	15.5	4.6	3.9	4.5	1.0	-70	-75	-71	-93
383 Electrical machinery	5.4	5.6	4.4	3.1	2.0	4	-20	-44	-64
384 Transport equipment	2.6	2.7	10.2	1.1	0.6	6	298	-56	-79
385 Profesional and scientific equipment	5.3	2.3	11.6	0.2	0.0	-56	118	-96	-100
390 Other manufacturing	7.9	5.4	6.6	4.8	1.6	-31	-16	-39	-80

Chapter 7

The role of firm characteristics in shaping firms' responses to the crisis: a descriptive analysis

7.1 Introduction

The previous chapter demonstrated there was a large cross-sectional variation in performance impact of the crisis at the plant level. This variation occurred both during the peak of the crisis and the early recovery period, and even at the disaggregated industry level. This and the following chapter ask which firm characteristics were important in shaping plant success in responding to the crisis?

Two quantitative approaches are presented to answer this question: descriptive and econometric analysis. This chapter presents the former, providing a picture of how the impact on performance varied across different groups of plants according to their characteristics.

The rest of this chapter is organised as follows. Section 7.2 spells out the hypotheses. Section 7.3 discusses the proxy variables and describes their measurement. Section 7.4 presents the descriptive analysis. The main findings of this chapter are summarised collectively with the findings of the next chapter.

7.2 Hypotheses

This study considers the following plant characteristics, all of which are able to be measured from the database: size, age, ownership, sales orientation, financial leverage, import dependence, factor intensity and competition.

Before discussing the empirical results, it is important to spell out the hypotheses based on the discussion in Chapter 4. To organise the discussion, this section focuses only on the direct effect of each characteristic. The hypotheses about some interaction effects are discussed in the next chapter along with their empirical findings.

a. Size

The impact of firm size on performance during the crisis is difficult to predict a priori (*Hypothesis 1*). Large firms might have been more successful because of advantages which stem from economies of scale, market power and employment of more skilled managers. Moreover, they were unlikely to suffer from credit rationing as banks tended to adopt more stringent lending policies after the crisis. However, inflexibility to changes in the business environment and dependence on the financial sector might also have made them less successful than small firms. Small firms might also have performed better due to less expensive overheads and often operate in niche markets which might not be so severely affected by the crisis.

b. Age

Similar to size, the impact of firm age is unclear (*Hypothesis 2*). Older firms might have performed better owing to greater experience and familiarity with the business environment, having built up a reputation and business network which could provide them with more survival strategies. However, the experience effect might not be particularly large and important in the Indonesian context. It must be recognised that the 1997/98 crisis was the first major economic crisis since the mid 1960s, so there were no "prior" lessons for firms on how to deal with such a deep economic contraction.

c. Ownership

Foreign firms are expected to have responded better than domestic-private and state-owned enterprises (SOEs) (*Hypothesis 3A*), and the relationship between foreign ownership and the crisis' impact on performance is expected to be positive (*Hypothesis 3B*). They might have sought financial support from their international-linked sources and have been able to benefit from the boost in competitiveness from the sharp exchange rate depreciation. However, this expected better performance for foreign firms might have depended on the percentage of foreign share in the firms (*Hypothesis 3C*). The flow of firm-specific assets, which give the affiliates abilities to successfully respond to the crisis, might be restricted for firms with no or low foreign ownership share.

The effect of government ownership is ambiguous (*Hypothesis 3D*). SOEs might have responded better given the government's commitment to support and ability to bail them out financially. However, pressure on the government's budget during the crisis might have substantially reduced this support. The impact of government ownership in contrast might have been positive because the threat of bankruptcy could discipline SOEs' managers to behave in the interest of the government as owner.

d. Sales orientation

Export-oriented firms are expected to have performed better than domestic-oriented ones (*Hypothesis 4)*. They were able to take advantage of the boost in competitiveness from the sharp exchange rate depreciation, as a result of lowered relative costs of labour and cheaper exporting goods. However, the expected positive effect might have been weak. As discussed in Chapter 4, there are some reasons which may have caused a weak export response. Moreover, a weak relationship may also be observed simply because there were many cancellations of export orders due to the social and political turmoil in 1998.[1]

e. Financial leverage

Highly leveraged firms are expected to have been severely affected by the crisis (*Hypothesis 5*). Their ability to seek external financing was likely to be reduced significantly as debt service costs increased sharply. However, the expected negative impact is likely to have varied considerably across firms. Some firms might have been able to negotiate with their banks to defer a substantial portion of their debt payments (principal and interest). One problem with the quantitative approach employed in this study is that it is difficult to identify which firms (or plants) were successful in negotiating debt payment. Hence the expected impact might have been weak. Nevertheless, much of the effect of this debt resolution is likely captured by other variables, namely firm size, age and sales orientation. Large and old firms are more likely to have been able to negotiate their debt payment because banks usually have more information about these firms. Exporters also have a higher chance for negotiation because they generate foreign-currency denominated revenue which can increase lenders' confidence in the firms' payment capability.

Financial leverage also captures the effect of bank-dependency. The collapse of the domestic financial system should have significantly reduced the amount of loanable funds through the

[1] See the descriptive analysis in Chapter 2.

bank-lending channel, and should have severely affected bank-dependent firms. Nonetheless, this effect might have been captured by the effect of size. Previous studies (e.g. Claessens et al. 2000) found that bank-dependent firms in Asian countries are mostly large.

f. Import dependency

Firms that use a large share of imported input are expected to have been adversely affected by the crisis (*Hypothesis 6*). A high share of imported input increases production costs in terms of local currency and outweighs the lowered relative labour costs stemming from the sharp exchange rate depreciation.

g. Factor intensity

Firms in labour- and resource-intensive industries should have been less affected than those in capital-intensive industries (*Hypothesis 7A*). They are able to benefit from cheaper production costs – vis-à-vis firms abroad – as a result of the exchange rate depreciation.

Hypothesis 7A assumes that factor intensity at industry level to a large extent reflects factor intensity at firm level. However, in practice there might be a large variation in intensity across firms. Accordingly, the following are hypothesised:

- Firm-level capital intensity is negatively related to the performance impact of the crisis (*Hypothesis 7B*).
- Firm-level skill intensity is negatively related to performance impact of the crisis (*Hypothesis 7C*).

h. Competition

This study considers two aspects for the role of competition: trade and product market competition. For the former, the impact is ambiguous (*Hypothesis 8A*). On the one hand, firms in less protective industries might have been more successful because they tend to have more efficient management and hence are more resilient to changes in economic shocks. On the other hand, firms may have contracted more because they only have small "room" to compress their economic rents compared to those in protected industries.

The impact of product market competition is also difficult to predict a priori (*Hypothesis 8B*). Performance contraction might have been lower for firms in a non-competitive industry because they might have strongly exercised their market power in response to contracted demand. Industrial organisation theory predicts dominants firms might initiate collusive behaviour during a low demand situation. In contrast, the contraction might have been higher in non-competitive industries because the deep economic demand contraction might have completely eliminated the ability of firms to exercise market power. Industrial organisation theory predicts any collusive arrangement could break down in such a situation.

7.3 Firm characteristic variables and their measurement

The following variables are employed to account for the firm characteristics discussed earlier. Unless otherwise stated, the variables are defined in their pre-crisis values, i.e. the average values of 1995 and 1996. The average was taken because 1996 was unlikely be a 'normal' year. As noted in the previous chapter, the values of 1993-94 were not taken into account to minimise the variation in the variables' values. Some variables, such as sales orientation and ownership, can change dramatically over a short period of time.

a. Size

Size ($SIZE_i$) is proxied by number of employees. The other common alternatives, such as output or profits, are not used as they tend to be more sensitive to changes in the business cycle. Previous studies found mixed results on the relationship between profitability and business cycles. For example, Domowitz et al. (1986) found a positive relationship while Rotemberg and Saloner (1986) found a negative one. As for output, even if real value is used, there is still a substantial limitation in the quality of price index computed by the statistical agency. Therefore, the use of output-based proxy could result in less precise estimates.

b. Age

Age of plant (AGE) is proxied by the number of years the plant has been in commercial production.

c. Ownership

Two types of variables were created to facilitate the hypotheses testing on firm ownership: continuous and dummy ownership variables. Two continuous ownership variables were created for every plant i: the percentage share of foreign ownership (FOR_i) and the percentage share of government ownership (GOV_i). Three dummy variables were created for every plant plant i: domestic-private ($DPRI_i$), foreign ($DFOR_i$) and state-owned plants ($DGOV_i$). $DPRI_i$ and $DFOR_i$ are defined as

$$DPRI_i \begin{cases} =1 & \text{if the share of domestic-private ownership in} \\ & \text{plant } i \text{ is equal to 100 per cent} \\ =0 & \text{otherwise.} \end{cases}$$

$$DFOR_i \begin{cases} =1 & \text{if } FOR_i > 0 \text{ per cent} \\ =0 & \text{otherwise.} \end{cases}$$

Three joint venture groups of plants, which are foreign-government, foreign-domestic and foreign-government-domestic, are considered foreign plants (i.e. $DFOR_i = 1$). This consideration is based on previous empirical studies which suggest the share of foreign ownership does not necessarily reflect the extent of control. According to Aswicahyono and Hill (1995), many Indonesian case studies have demonstrated that local partners often play a relatively minor role even when they hold the majority of equity. This is particularly true for matters related to finance and technology. Moreover, Ramstetter (1999) demonstrated that one important role of foreign ownership is to widen a firm's access to international market. For plants in Indonesian manufacturing, he showed the propensity to export was even higher for plants with a low foreign ownership share (10 to 50 per cent), compared to that for the domestic plants.

The other groups of plants not considered are state-owned plants and the group of government-domestic private. Following a similar argument as for $DFOR_i$, the government-domestic group is classified as 'government' and hence, $DGOV_i$ is defined as

$$DGOV_i \begin{cases} =1 & \text{if } GOV_i > 0 \text{ per cent} \\ =0 & \text{otherwise.} \end{cases}$$

d. Sales orientation

Sales orientation is proxied by plant export propensity (EXP). For plant i, it is defined as the ratio of export to total output

$$EXP_i = \frac{EX_i}{Output_i}$$

where EX_i is export of plant i. EX_i is not reported in SI data. As in previous empirical studies, EX_i is estimated by multiplying the percentage of exported output in production (i.e. $PRPREX$ in SI data) with the value of output.

e. Import dependence

Import dependence ($IMDEP_i$) is proxied by the intensity of imported input in total input. For plant *i*, it is defined as

$$IMDEP_i = \frac{(value\ of\ imported\ input)_i}{(value\ of\ imported\ +\ domestic\ input)_i}$$

The domestic input here is defined as the domestically produced input, which is different to the concept of domestic input in Input-Output Table sense.

f. Financial leverage

In empirical literature, financial leverage is usually proxied by some financial ratios, such as debt-to-equity ratio, debt ratio and interest coverage ratio. All of these are computed based on a firm's accounting information (balance sheets and income statement). Although data on balance sheets are unreliable and incomplete, this study employs interest coverage ratio to construct variable financial leverage (LEV). For plant *i*, it is defined as

$$LEV_i = \frac{1}{(\text{Interest Coverage})_i}$$

where

$$(\text{Interest coverage ratio})_i = \frac{(\text{EBIT})_i}{(\text{interest payments})_i}$$

and $EBIT_i$ is equal to sales (or earnings) before deduction of interest payments and income taxes.

Interest coverage ratio measures the number of times a firm's earnings exceed debt payments. In other words, it indicates how well a firm's earnings can cover interest payments. In general, a low interest coverage ratio implies that a firm is highly leveraged (i.e. higher LEV_i) and has low capability to take on additional debt (i.e. more financially constrained).

While often used in empirical studies, the ratio – as with the other leverage ratios – is very approximate. In general, this is because the ratio tends to understate the true extent of a firm's financial leverage. It focuses only on servicing the interest liability and does not take into account debt repayment. Usually, repayment of debt principal is higher than the interest payment, and therefore drains a larger amount of cash than the interest payment. In addition, the ratio does not take into account other mandatory and discretionary items, such as dividends and capital commitment, which are not included in – and thus overstate – the earnings figure.

g. Factor intensity

This study employs two types of variables to measure factor intensity: industry-level and plant-level variables. For the former, dummy variables are created based on the industry classification defined by Ariff and Hill (1985). The ISIC version of this classification is provided in Appendix 8.1. Based on this classification, three dummy variables were created for resource-intensive (DRI_j), labour-intensive (DLI_j) and capital-intensive industries (DCI_j). For industry j,

$$DRI_j \begin{cases} =1 & \text{if industry } j \text{ is classified as mineral- or} \\ & \text{resource-intensive industries.} \\ =0 & \text{otherwise.} \end{cases}$$

$$DLI_j \begin{cases} = 1 & \text{if industry } j \text{ is classified as unskilled labour-intensive industries.} \\ = 0 & \text{otherwise} \end{cases}$$

$$DCI_j \begin{cases} = 1 & \text{if industry } j \text{ is classified as technology- or human capital-intensive industries} \\ = 0 & \text{otherwise} \end{cases}$$

Industry *j*, both for these dummy variables and the other industry-level variables used in this thesis, is defined at the four-digit ISIC level.

For the plant-level variables, two groups of variables were created: capital intensity and skilled-labour intensity. In the absence of reliable data on capital stock, capital intensity is measured in two ways ($PCI1$ and $PCI2$). For plant i, $PCI1$ is defined as the ratio of non-wage value added to labour:

$$PCI1_i = \frac{(non-wage\ value\ added)_i}{(total\ number\ of\ employee)_i}$$

$$= \frac{(value\ of\ output)_i - (inputs)_i - (wages\ and\ salary)_i}{(total\ number\ of\ employee)_i}$$

$PCI2$ is defined as the ratio of energy costs to production labour, motivated by previous studies showing that capital and energy are complementary inputs in production (Globerman et al. 1994). For plant i,

$$PCI2_i = \frac{(energy\ costs)_i}{(total\ numbers\ of\ production\ employee)_i}$$

$$= \frac{(fuel\ costs)_i + (electricity\ costs)_i}{(total\ numbers\ of\ production\ employee)_i}$$

Similarly, skilled labour intensity is measured in two ways ($PSI1$ and $PSI2$). For plant i, $PSI1$ is defined as the average of wages and salary per employee

$$PSI1_i = \frac{(total\ \text{exp}\,enditure\ on\ wages\ and\ salary)_i}{(total\ numbers\ of\ employee)_i}$$

The major limitation of $PSI1$ is that it might be distorted by imperfection in the labour market, although the Indonesian labour market was generally competitive before the crisis. Therefore, an alternative measure of the variable ($PSI2$) is employed. For plant i, $PSI2$ is defined as the ratio of non-production to production labour

$$PSI2_i = \frac{(total\ numbers\ of\ non\text{-}production\ employee)_i}{(total\ numbers\ of\ production\ employee)_i}$$

h. Competition

For industry competition, this study employs the concentration ratio of the largest four plants in an industry ($CR4$) and the Herfindahl Index (HHI) to proxy the extent of competition in the product market. For industry *j*, the formula for both proxies are

$$CR4_j = \frac{\sum_{i=1}^{4} VA_i}{\sum_{i=1}^{n} VA_i}$$

$$HHI_j = \sum_i \left(\frac{VA_i}{\sum VA_i} \right)^2$$

where VA_i is the value added of plant i in industry j.

This study uses import penetration ratio (IMP) and the level of trade protection to measure the extent of competition arising from trade. IMP for industry j is defined as

$$IMP_j = \frac{M_j}{Q_j}$$

where Q_j and M_j are the domestic production and imports in industry j, respectively. The alternative measure of import penetration in which the denominator of IMP_j is the sum of the domestic production and net import is not employed because it could mislead the interpretation (Athukorala and Hazari 1988). For instance, if exports in an industry have outpaced imports, the alternative measure suggests that industry's trade competitiveness deteriorates, when in fact the opposite has occurred.[2]

For trade protection, two proxies are chosen: nominal rate of protection (NRP) and effective rate of protection (ERP). NRP measures the extent of protection to an industry provided directly by the tariff on its output. In contrast, ERP measures the extent of protection provided by the entire tariff structure, taking into account the effects of tariffs on inputs as well as on outputs (Corden 1966).

These two proxies have been used in other empirical studies. However, there is no consensus among researchers on the best proxy. Clearly, ERP is theoretically superior, since it measures the extent to which resources in an economy are reallocated by the entire tariff structure (Corden 1966; Caves et al. 1980). Nevertheless, NRP is presumably more realistic in practice, since interest groups tend to be concerned more with the nominal rates of protection on outputs rather than on inputs (Cheh 1974). Analysis in this study experimented with the two proxies.

This study uses average tariff rates calculated by the WTO (WTO 1995) which covers trade policy until the end of 1994. The rates are available at four-digit ISIC level. For ERP, this study employed the ERP estimates calculated by Fane and Condon (1996). The estimates cover the period immediately after the May 1995 trade reform package. They are available for 131 sectors based on the 1990 Input-Output table, of which 88 are manufacturing sectors.

7.4 Descriptive analysis

This section statistically describes the variation in performance impact of the crisis across groups of plants by their characteristics. The objective is to examine whether there are some

[2] The alternative import penetration ratio is defined as

$$IMP_j = \frac{M_j}{Q_j + M_j - X_j}, \text{ where } X_j \text{ is exports in industry } j$$

systematic patterns in the variation and to serve as a prelude to a formal econometric test in the next section. For every group, the mean of the percentage difference in performance ($\%\Delta y_{i,t}$) was computed for the period 1998-2000, which covers the peak of the crisis (1998) and the early recovery (1999-2000).[3] i and y denote plant and performance measures, respectively. This chapter, as with the previous one, includes the following as the performance measures:

- Output, proxied by real value added (RVA) and real gross output (ROUT).
- Employment, proxied by the number of employees (EMPL).
- Labour productivity, proxied by real value added per labour (RVL).
- Profitability, proxied by price-cost margin (PCM).

Definition of these measures has been discussed in Chapter 6. The computational results are presented in Tables 7.1 to 7.14. Unless otherwise stated, they have been computed by the author from the data base.

7.4.1 Size

Plants were classified into five groups which make up three more aggregated groups of small, medium and large plants: small plants (average number of employees in 1995 and 1996, or $SIZE_{i,9596}$, was between 20-49 and 50-99), medium plants ($SIZE_{i,9596}$ was between 100-199 and 200-499); and large plants ($SIZE_{i,9596}$ was greater than 500).

The results are given in Table 7.1. Focusing first on the whole period 1998-2000 (i.e. the first column for each performance measure), the results seem to suggest a positive relationship where the contraction in performance is lower for larger plants. They even indicate some large plants expanded in terms of output and labour productivity. The relationship, however, can only be seen clearly for the differences in labour productivity and profitability. For the other performance measures, plants in the smallest group (Small 1) are indicated to have contracted less than plants in the other group of small plants (Small 2).

The results do not reveal any apparent pattern of change between the peak of the crisis and the early recovery period except for the average differences in profitability. Regarding

[3] The definition of peak of the crisis and early recovery period follows that used in the previous chapter.

profitability, the pattern becomes unclear in the early recovery period. The average contraction among the group of large plants increases in the early recovery period but the average contraction among the group of the smallest plants declined at this time.

The unclear relationship observed in Table 7.1 could be because size might represent other plant characteristics that significantly affected performance. Large firms are often multinationals, exporters and located in concentrated industries. Therefore, these characteristics need to be controlled for to reveal the true relationship and this is done in the next section.

It is worth mentioning that the results seem to suggest an adjustment to improved efficiency in large firms. Large plants appear to have shed labour but produced more, albeit only slightly. This suggestion is corroborated by the results which indicate an increase in labour productivity among large plants during the period 1998-2000. The results show that large plants on average increased their real value added per labour by about 9 per cent during this period.

Table 7.1 The crisis performance impact by size groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Size class									
Small 1	-15.4	-17.4	-8.5	-10.8	-11.7	-7.2	-1.9	-2.0	-0.8
Small 2	-21.5	-23.2	-15.6	-19.2	-19.9	-15.9	-9.7	-9.6	-8.9
Medium 1	-17.5	-19.8	-11.8	-18.5	-18.9	-16.8	-4.6	-4.9	-3.6
Medium 2	-11.1	-13.4	-5.3	-11.3	-13.1	-6.4	-5.2	-5.5	-4.4
Large	1.4	1.2	2.3	1.8	1.3	3.0	-4.0	-4.6	-2.6

Table 7.1 continued

Table 7.1 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Size class						
Small 1	-15.3	-17.2	-9.6	-10.6	-11.3	-7.7
Small 2	-10.0	-11.7	-5.2	-6.1	-4.7	-7.8
Medium 1	-8.5	-10.7	-3.3	-7.3	-7.2	-7.2
Medium 2	-2.8	-4.8	2.2	-6.9	-6.1	-7.4
Large	9.1	9.1	9.4	-1.2	-0.1	-4.4

Note : Definition of plant size groups:

Small 1: $20 \leq SIZE_{i,9596} \leq 49$

Small 2: $50 < SIZE_{i,9596} \leq 99$

Medium 1: $99 < SIZE_{i,9596} \leq 199$

Medium 2: $99 < SIZE_{i,9596} \leq 499$

Large: $SIZE_{i,9596} > 499$

7.4.2 Age

Plants were classified into three groups according to the years spent in commercial production until 1996 ($AGE_{i,96}$): young ($AGE_{i,96}$ equal to or less than 5 years); middle-aged plants ($AGE_{i,96}$ between 5 and 15 years); and old plants ($AGE_{i,96}$ greater than 15 years).

The results presented in Table 7.2 seem to suggest a negative relationship between contraction in performance and firm age. For the period 1998-2000, old plants on average experienced a larger contraction in respect to all performance measures except profitability. This relationship persists during the peak of the crisis and in early recovery. The pattern therefore does not provide support for the importance of experience. Nevertheless, the inference is not robust as what was reflected in the table has not been controlled for the effect of the other characteristics.

Table 7.2 The crisis performance impact by age groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Age class									
Young	-4.8	-6.6	2.0	-2.5	-3.7	2.3	0.4	-0.1	2.5
Middle-aged	-17.5	-19.3	-11.9	-14.9	-15.7	-12.2	-5.9	-6.0	-5.2
Old	-22.8	-24.7	-17.2	-19.9	-20.4	-17.5	-6.9	-6.7	-6.8

Table 7.2 continued

Table 7.2 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Age class						
Young	-6.1	-7.3	-1.3	-8.2	-7.8	-7.7
Middle-aged	-10.8	-12.6	-5.6	-9.1	-8.7	-8.4
Old	-13.4	-15.7	-7.7	-6.7	-7.3	-5.3

Note : Definition of plant age groups:

Young: $0 \leq AGE_{i,96} \leq 5$

Middle-aged: $5 < AGE_{i,96} \leq 15$

Old: $AGE_{i,96} > 15$

7.4.3 Ownership

To examine the role of firm ownership, plants are classified into the groups as in the three dummy ownership variables: domestic private ($DPRI_{i,9596}$), foreign ($DFOR_{i,9596}$), and government plants ($DSOE_{i,9596}$). The definition of these variables was discussed in the previous section.

The results presented in Table 7.3 support the hypothesis that foreign firms responded better than other firms during the crisis (*Hypothesis 3A*). The average differences in output and labour productivity are positive during the peak of the crisis among the group of foreign plants, indicating some foreign plants expanded during this time. In line with this observation, the average contraction in employment and profitability among this group of plants was very small compared to that of the other groups.

The positive impact of foreign ownership is indicated to be even higher in the early recovery period and average expansion in performance for the group of foreign plants is indicated to significantly higher than during the peak of the crisis.

As explained, the observed better performance of foreign plants is most likely due to their ability to boost competitiveness from the exchange rate depreciation during the crisis. This suggests the impact of foreign ownership might be interrelated with the other plant characteristics, particularly sales orientation. This interrelationship will be tested in the econometric analysis.

Table 7.3 The crisis performance impact by ownership groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Ownership class									
Foreign	8.6	4.6	20.9	4.6	2.6	12.2	0.5	-0.4	2.9
Private-domestic	-16.0	-17.9	-9.7	-13.5	-14.1	-10.5	-5.0	-5.1	-4.3
Government	-26.6	-26.3	-23.7	-16.8	-15.9	-18.0	-9.8	-9.1	-11.0

Table 7.3 continued

Table 7.3 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Ownership class						
Foreign	7.6	4.4	17.5	-5.7	-5.5	-4.8
Private-domestic	-11.4	-13.2	-5.8	-9.8	-9.7	-8.9
Government	-19.7	-20.1	-15.8	-21.9	-24.9	-19.4

Note : Definition of plant ownership groups:

Foreign: $DMNC_{i,9596} = 1$

Private domestic: $DPRI_{i,9596} = 1$

Government: $DGOV_{i,9596} = 1$

The table also show government plants were severely affected by the crisis. Their output and profitability on average fell by more than 20 per cent for the entire period 1998-2000, in addition to moderately high employment contraction. These results do not suggest the government – as main shareholder – bailed out these firms. This probably reflects the tight fiscal situation during the crisis when, as discussed, the government's ability to raise revenue fell substantially.

Given the picture in Table 7.3, it is important to examine the variation in performance differences across foreign plants in order to understand whether the suggested better performance of plants depends on foreign ownership share or, in other words, to test informally *Hypothesis 3C*. Table 7.4 presents the results. Foreign plants are classified into four groups: plants with low foreign ownership (average foreign share in 1995 and 1996, or $FOR_{i,9596}$ less than or equal to 20 per cent); plants with moderately-low foreign ownership ($FOR_{i,9596}$ between 20 and 50 per cent); plants with moderately-high foreign ownership ($FOR_{i,9596}$ between 50 and 80 per cent); and plants with high foreign ownership ($FOR_{i,9596}$ greater than 80 per cent).

The table provides some support for the hypothesis. First, focusing on the results during the peak of the crisis, a positive relationship between contraction in performance and foreign ownership is suggested. That is, the contraction was lower among plants with a higher share of foreign ownership. Second, the performance expansion observed earlier in Table 7.3 was likely to have originated from the plants with high foreign ownership. The magnitude of expansion is large: about 30 per cent in real value added and 10 per cent in employment, leading to an increase in real value added per labour by about 20 per cent. Finally, the average contraction in performance at the group of foreign plants with a very low foreign ownership share (less than 20 per cent) was extremely large during the peak of the crisis. For real value added, real gross output and price-cost margin, this is about 45, 35 and 33 per cent respectively.

Although displaying a positive relationship, the pattern is less clear for the early recovery period. While plants with high foreign ownership are suggested to have performed far better than the other plants, plants with moderately-low foreign ownership performed better than plants with moderately high foreign ownership. This finding is particularly evident in the differences for output and labour productivity.

The same experiment as in Table 7.4 was conducted to further explore the effect of government ownership. The results are presented in Table 7.5 where all government plants are grouped according to a similar rule as in Table 7.4.[4]

It turns out that, although no clear pattern emerges from Table 7.5, across the performance measures and for the two sub-periods, two observations are worth noting. First, the differences in real gross output seems to suggest a negative relationship: the contraction is higher for plants with a high government share (more than 80 per cent). This pattern is even clearer for the early recovery period. This finding is consistent with the theoretical prediction that SOEs are less efficient than private firms due to higher managerial slackness. Perhaps more importantly, the finding suggests the adjustment of the Indonesian manufacturing SOEs does not follow that commonly observed in developed countries. Some studies (e.g. Bortero and Rondi 1999, 2002) show SOEs are able to improve their performance under fiercer competition and lower budget assistance from government.

While this chapter does not go deeper into the underlying factor of this finding, a comment is worth making. The finding implies that the threat of bankruptcy stemming from the crisis was apparently not able to reduce managerial slack in the SOEs. It does not mean, however, that the threat was not large. The threat might simply have been considered low by the SOEs managers because of a perception that the government would guarantee their existence, mainly for the social objective they carry (particularly in providing employment).

The comment above is consistent with the second observation which suggests that to some extent SOEs retained their employees. The contraction in employment was significantly lower for the plants with a very high government ownership share (more than 80 per cent).

[4] See Table 7.5 for the details of the definition.

Table 7.4 The crisis performance impact by foreign ownership groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Foreign ownership class									
Low	-42.5	-45.4	-19.1	-35.2	-34.5	-21.7	-15.2	-14.2	-10.9
Moderately low	-6.4	-14.5	18.0	-13.8	-18.0	2.2	-6.6	-7.8	-3.4
Moderately high	-4.8	-7.8	3.2	-7.1	-10.2	0.2	-5.3	-6.2	-3.3
High	31.9	29.6	38.5	28.0	27.8	29.4	10.4	9.7	12.3

Table 7.4 continued

Table 7.4 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Foreign ownership class						
Low	-27.1	-31.0	-7.9	-29.2	-32.6	-15.4
Moderately low	-1.2	-8.0	20.2	-4.3	-6.0	0.7
Moderately high	0.3	-1.7	6.2	-5.0	-2.8	-9.3
High	21.2	19.5	25.9	-5.4	-5.3	-4.0

Note : Definition of plant foreign ownership groups:

Low: $0 > FOR_{i,9596} \leq 20$

Moderately low: $20 > FOR_{i,9596} \leq 50$

Moderately high: $50 > FOR_{i,9596} \leq 80$

High: $FOR_{i,9596} > 80$

Table 7.5 The crisis performance impact by government ownership groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Government ownership class									
Low	-33.3	-35.6	-28.0	-3.2	-7.2	6.7	-18.3	-20.9	-13.2
Moderately low	-16.3	-22.6	-2.7	-9.8	-11.2	-6.8	-4.0	-2.9	-7.6
Moderately high	-35.0	-27.9	-52.6	-25.4	-18.8	-37.4	-13.7	-12.6	-15.6
High	-29.6	-26.9	-30.3	-20.5	-18.4	-24.0	-11.1	-10.3	-11.9

Table 7.5 continued

Table 7.5 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Government ownership class						
Low	-16.4	-16.0	-16.2	-43.9	-49.2	-46.3
Moderately low	-15.8	-23.1	1.2	-15.9	-25.4	-1.9
Moderately high	-21.8	-16.0	-37.6	-17.4	-15.4	-19.6
High	-21.5	-19.5	-21.5	-22.4	-22.9	-23.9

Note : Definition of plant foreign ownership groups:

Low: $0 > GOV_{i,9596} \leq 20$

Moderately low: $20 > GOV_{i,9596} \leq 50$

Moderately high: $50 > GOV_{i,9596} \leq 80$

High: $GOV_{i,9596} > 80$

7.4.4 Sales orientation

To examine the impact of sales orientation, plants are categorised into four groups based on their average export propensity in 1995 and 1996 ($EXP_{i,9596}$): domestic oriented plants ($EXP_{i,9596}$ equal to zero); low export oriented plants ($EXP_{i,9596}$ between zero and 0.1); moderately export oriented ($EXP_{i,9596}$ between 0.1 and 0.5) and highly export oriented ($EXP_{i,9596}$ greater than 0.5).

The results are presented in Table 7.6. Consider, first, the results for the entire period. A positive relationship where contraction in the performance decreases as export propensity increases is suggested. However, this relationship is only weakly suggested by the differences in employment and profitability.

The results also indicate that plants with high export propensity greatly benefited from the crisis. Excluding the results for profitability, some of these plants appeared to have expanded during the period. The findings provide some support for the hypothesis that export-oriented firms performed better than domestic-oriented ones (*Hypothesis 4*).

Turning to the figures for the crisis peak and the early recovery period, the results show that the positive impact of sales orientation seems to have been weaker during the early recovery. This is particularly clear for the group of plants with high export intensity, where output and labour productivity expansion was significantly lower in this period.

Although the impact of sales orientation as a single factor is fairly clear from Table 7.6, it might have depended on other firm characteristics. As explained in Chapter 4, the two most important are foreign ownership and leverage. As with other characteristics, these interrelationships are tested in the next section.

Table 7.6 The crisis performance impact by sales orientation groups

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Sales orientation class									
Domestic oriented	-19.6	-22.2	-12.1	-16.9	-18.4	-12.5	-5.1	-5.2	-4.2
Low export oriented	-19.9	-22.1	-13.6	-14.1	-17.0	-7.2	-3.2	-3.3	-2.7
Moderately export oriented	-3.0	-4.2	1.4	0.0	0.1	0.8	-3.5	-3.8	-2.0
Highly export oriented	8.9	11.5	5.0	10.0	12.9	5.4	2.0	1.8	3.0

Table 7.6 continued

Table 7.6 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Sales orientation class						
Domestic oriented	-13.5	-16.0	-6.8	-8.7	-9.0	-7.0
Low export oriented	-10.0	-12.3	-4.0	-12.3	-9.8	-15.4
Moderately export oriented	-0.6	-1.5	2.4	-7.0	-6.3	-7.2
Highly export oriented	6.0	8.5	2.1	-4.5	-2.6	-7.3

Note : Definition of plant sales orientation groups:

Domestic oriented: $EXP_{i,9596} = 0$

Low export oriented: $0 < EXP_{i,9596} \leq 0.1$

Modereately export oriented: $0.1 < EXP_{i,9596} \leq 0.5$

Highly export oriented: $EXP_{i,9596} > 0.5$

7.4.5 Import dependence

Plants were categorised into five groups based on the average of the imported to total input ratio in 1995 and 1996 ($IMDEP_{i,9596}$). The first is completely domestic input dependent plants, defined as plants that do not use any imported input. The second and other groups are categorised based on the quartiles of $IMDEP_{i,9596}$ distribution of the remaining plants: low import dependent plants ($IMDEP_{i,9596}$ between 0 and 0.1); moderately low import dependent plants ($IMDEP_{i,9596}$ between 0.1 and 0.36); moderately high import dependent plants ($IMDEP_{i,9596}$ between 0.36 and 0.74); and highly import dependent plants ($IMDEP_{i,9596}$ greater than 0.74).

As shown in Table 7.7, there is no clear relationship between the contraction in performance and the ratio of imported to total input. On the one hand, the differences in real output and employment exhibit a U-shaped pattern, with moderately low import dependent plants on average having experienced the largest contraction. This pattern is observed for the entire 1998-2000 period. On the other hand, a positive relationship is weakly suggested for the differences in real value added and labour productivity for the entire period. The finding does not support *Hypothesis* 6 and tends to contradict the previous observation on the impact of sales orientation. One possible explanation is that the effect of import dependency might have depended on some other characteristics.

Table 7.7 The crisis performance impact by groups of import dependence

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Import dependence class									
Domestically import-dependent	-15.4	-16.9	-10.3	-11.2	-11.8	-8.7	-4.0	-4.0	-3.2
Low import-dependent	-12.7	-13.9	-9.0	-16.9	-16.9	-15.2	-4.4	-4.5	-3.7
Moderately low import-dependent	-17.5	-18.6	-14.4	-19.4	-20.3	-16.8	-6.5	-7.1	-4.5
Moderately high import-dependent	-8.0	-13.0	4.5	-15.5	-18.9	-6.7	-4.3	-5.1	-2.2
Highly import-dependent	-8.8	-15.2	7.0	-11.2	-15.5	0.2	-3.0	-3.5	-1.3

Table 7.7 continued

Table 7.7 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Import dependence class						
Domestically import-dependent	-10.9	-12.5	-6.3	-8.9	-8.8	-7.9
Low import-dependent	-6.4	-7.6	-3.1	-3.7	-4.2	-2.0
Moderately low import-dependent	-7.9	-8.1	-6.4	-6.3	-4.0	-9.9
Moderately high import-dependent	-3.4	-7.4	6.7	-3.0	-3.5	-1.8
Highly import-dependent	-5.6	-10.8	7.6	-7.8	-7.7	-6.2

Note : Definition of plant sales orientation groups:

Domestically import-independent: $IMDEP_{i,9596} = 0$

Low import-dependent: $0 < IMDEP_{i,9596} \leq 0.1$

Moderately low import-dependent: $0.1 < IMDEP_{i,9596} \leq 0.36$

Moderately high import-dependent: $0.36 < IMDEP_{i,9596} \leq 0.74$

Highly import-derpendent: $IMDEP_{i,9596} > 0.74$

7.4.6 Leverage

Plants were classified based on the average of interest coverage ratio in 1995 and 1996 ($LEV_{i,9596}$). Non-leveraged plants are defined as the plants with zero $LEV_{i,9596}$. The other four groups are classified based upon the quartiles of $LEV_{i,9596}$ distribution of the remaining plants: low leveraged plants ($LEV_{i,9596}$ is between 0 and 0.04); moderately low leveraged ($LEV_{i,9596}$ is between 0.04 and 0.1); moderately high ($LEV_{i,9596}$ is between 0.1 and 0.25); and highly leveraged ($LEV_{i,9596}$ is greater than 0.25).

The results in Table 7.8 do not suggest a clear relationship between contraction in performance and financial leverage. The differences seem to suggest a positive relationship for the differences in output (real value added and real gross output) but a negative one for the differences in employment and profitability. Therefore the patterns only provide weak support for *Hypothesis 5*. However, it needs to be confirmed by econometric analysis because – as with the other characteristics – they might have been affected by other factors.

Table 7.8 The crisis performance impact by groups of financial leverage

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Leverage class									
Non-leveraged	-10.4	-12.8	-2.1	-8.5	-9.8	-3.5	-3.0	-3.1	-2.0
Low leveraged	-31.5	-32.1	-27.9	-20.2	-19.4	-20.5	-6.3	-6.1	-6.1
Moderately low leveraged	-26.2	-28.6	-19.3	-17.4	-18.0	-14.9	-5.2	-5.4	-4.1
Moderately high leveraged	-14.8	-15.7	-11.1	-15.1	-14.8	-14.4	-7.3	-7.2	-6.9
Highly leveraged	-5.5	-7.6	1.4	-14.2	-15.0	-10.7	-8.3	-8.5	-7.0

Table 7.8 continued

Table 7.8 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Leverage class						
Non-leveraged	-7.7	-10.1	-0.6	-8.1	-8.2	-6.5
Low leveraged	-25.6	-26.5	-22.3	-23.1	-22.7	-22.2
Moderately low leveraged	-21.4	-23.6	-15.6	-19.2	-19.0	-18.1
Moderately high leveraged	-8.2	-9.1	-4.6	-8.9	-8.1	-9.8
Highly leveraged	2.3	0.4	7.9	3.4	3.1	4.0

Note : Definition of plant sales orientation groups:

Non-leveraged: $LEV_{i,9596} = 0$

Low leveraged: $0 < LEV_{i,9596} \leq 0.04$

Moderately low leveraged: $0.04 < LEV_{i,9596} \leq 0.1$

Moderately high leveraged: $0.1 < LEV_{i,9596} \leq 0.25$

Highly leveraged: $LEV_{i,9596} > 0.25$

7.4.7 Factor intensity

To examine whether factor intensity affected performance, plants are categorised into three groups based on the dummy-variables representing industry factor intensity defined earlier (DRI, DLI and DCI).

The results displayed in Table 7.9 suggest that factor intensity determined the performance impact, providing some support for *Hypothesis 7A*. Focusing on the entire 1998-2000 period, a clear pattern is observed for the differences across all performance measures. Plants in capital-intensive industries are suggested to have contracted the most severely while the opposite is suggested for plants in labour-intensive industries.

The pattern changes slightly in the early recovery period. The average contraction in output (real value added) and labour productivity for the group of plants in capital-intensive industries was lower in this time compared to that during the peak of the crisis. This change, however, does not necessarily reflect the change in the effect of factor intensity. The improvement in labour productivity might have been the result of a large employment contraction for plants in these industries relative to the other plants in resource- and labour-intensive industries.

Table 7.9 The crisis performance impact by groups of industries factor intensity

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Resource-intensive	-18.9	-14.9	-16.2	-13.7	-5.0	-13.8	-3.3	-3.1	-2.9
Labour-intensive	-5.7	-9.0	1.7	-4.2	-1.3	0.5	-3.7	-4.4	-2.4
Capital-intensive	-25.0	-31.7	-12.8	-25.9	-25.2	-16.5	-7.3	-8.0	-5.8

Table 7.9 continued

Table 7.9 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups						
Resource-intensive	-15.3	-12.1	-12.5	-8.7	-7.3	-6.5
Labour-intensive	-1.3	-3.6	4.8	-6.7	-6.6	-7.1
Capital-intensive	-15.9	-21.5	-5.0	-10.1	-8.1	-9.3

Note : See text and Appendix 8.1 for the definition of industry groups

The importance of factor intensity, however, is not clearly shown by performance variation according to the plant level factor intensity variables. Consider, first, the capital intensity variables ($PCI1$ and $PCI2$). Table 7.10a present the results for the groups of plants categorised by the quartiles of $PCI1$ (non-wage value added per labour): low, moderately low, moderately high and high capital intensive plants. For both the crisis peak and the early recovery period, no clear pattern emerges. The performance differences exhibit a negative relationship between the performance contraction and factor intensity in terms of output, labour productivity and profitability but a positive relationship in terms of employment. These relationships can also be observed in the differences of most performance measures when plants are categorised by the quartiles of $PCI2$ (energy cost per labour) (see Table 7.10b).

Turning to skill intensity variables ($PSI1$ and $PSI2$), the results again do not suggest a clear relationship. This is shown in Tables 7.11a and 7.11b which present the variation in performance differences across groups of plants categorised by the quartiles of the variables. While a negative relationship between the performance contraction and skill intensity is observed in the differences in output and labour productivity, a vague positive relationship is observed in the differences in employment and profitability.

Table 7.10a The crisis performance impact by groups of plant capital intensity (based on $PCI1_{i,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Capital intensity class									
Low capital intensive	4.4	1.4	13.4	2.6	0.8	8.7	-6.0	-5.8	-5.9
Moderately low	-6.1	-8.3	1.1	-7.3	-8.4	-3.5	-4.0	-4.0	-3.1
Moderately high	-17.8	-18.9	-12.3	-15.9	-16.0	-14.0	-4.2	-4.5	-3.0
High	-36.5	-37.6	-32.2	-26.2	-26.9	-23.5	-2.5	-3.0	-1.1

Table 7.10a continued

Table 7.10a concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Capital intensity class						
Low capital intensive	12.2	8.8	21.8	15.4	13.2	22.1
Moderately low	-1.4	-3.8	5.5	-3.1	-3.0	-2.8
Moderately high	-13.1	-14.0	-9.0	-16.0	-14.9	-16.5
High	-34.2	-34.8	-31.4	-23.9	-22.8	-24.5

Note : Definition of plant capital intensity groups:

Low: $0 < PCI1_{i,9596} \leq 763$

Moderately low : $763 < PCI1_{i,9596} \leq 2022$

Moderately high: $2022 < PCI1_{i,9596} \leq 6120$

High: $PCI1_{i,9596} > 6120$

Table 7.10b The crisis performance impact by groups of plant capital intensity (based on $PCI2_{i,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Capital intensity class									
Low capital intensive	-8.9	-9.5	-5.3	-3.5	-3.9	-1.1	-5.0	-4.9	-4.6
Moderately low	-14.1	-16.0	-8.1	-8.9	-9.7	-6.1	-4.6	-4.6	-3.9
Moderately high	-16.2	-18.1	-9.4	-14.7	-15.2	-11.6	-4.4	-4.5	-3.5
High	-18.7	-21.4	-11.4	-19.8	-21.6	-14.8	-2.6	-3.1	-1.0

Table 7.10b continued

Table 7.10b concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Capital intensity class						
Low capital intensive	-2.4	-3.2	0.7	-6.8	-6.8	-5.3
Moderately low	-9.1	-11.2	-3.1	-10.6	-10.9	-9.4
Moderately high	-10.6	-12.5	-4.6	-8.3	-7.7	-7.9
High	-16.3	-18.5	-10.4	-6.9	-6.8	-6.4

Note : Definition of plant capital intensity groups:

Low: $0 < PCI2_{i,9596} \leq 1.12$

Moderately low : $1.12 < PCI2_{i,9596} \leq 3.1$

Moderately high: $3.1 < PCI2_{i,9596} \leq 8.4$

High: $PCI2_{i,9596} > 8.4$

Table 7.11a The crisis performance impact by plant skill intensity (based on $PSI1_{i,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Skill intensity class									
Low	-10.4	-11.9	-4.9	-6.7	-7.1	-4.5	-5.1	-4.9	-4.7
Moderately low	-12.4	-14.4	-5.2	-9.5	-10.5	-5.8	-3.0	-3.0	-2.4
Moderately high	-16.5	-18.0	-11.4	-13.6	-14.2	-10.6	-4.3	-4.5	-3.3
High	-18.9	-21.1	-12.6	-17.9	-19.3	-13.7	-4.0	-4.6	-2.3

Table 7.11a continued

Table 7.11a concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Skill intensity class						
Low	-3.9	-5.7	1.5	-11.6	-12.3	-8.5
Moderately low	-8.1	-10.4	-1.4	-6.5	-6.7	-5.0
Moderately high	-13.0	-14.4	-8.9	-7.9	-7.1	-9.1
High	-13.9	-15.6	-9.1	-6.8	-6.3	-6.7

Note : Definition of plant skill intensity groups:

Low: $0 < PSI1_{i,9596} \leq 1083$

Moderately low : $1083 < PSI1_{i,9596} \leq 1606$

Moderately high: $1606 < PSI1_{i,9596} \leq 2357$

High: $PSI1_{i,9596} > 2357$

Table 7.11b The crisis performance impact by plant skill intensity (based on $PSI2_{i,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Skill intensity class									
Low	-13.8	-15.7	-7.5	-8.2	-8.7	-5.7	-4.0	-4.0	-3.2
Moderately low	-9.8	-11.5	-3.9	-6.8	-7.7	-2.9	-4.6	-4.6	-4.1
Moderately high	-14.1	-15.7	-8.7	-12.0	-12.6	-9.2	-3.4	-3.9	-1.7
High	-21.1	-23.3	-14.7	-21.3	-22.7	-17.4	-4.4	-4.6	-3.7

Table 7.11b continued

Table 7.11b concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Skill intensity class						
Low	-8.9	-10.9	-3.0	-8.6	-9.8	-4.1
Moderately low	-4.7	-6.5	0.7	-7.1	-6.8	-7.8
Moderately high	-10.9	-12.0	-7.2	-7.2	-6.0	-8.4
High	-15.0	-17.1	-8.9	-9.8	-9.6	-8.5

Note : Definition of plant skill intensity groups:

Low: $0 < PSI2_{i,9596} \leq 0.04$

Moderately low : $0.04 < PSI2_{i,9596} \leq 0.1$

Moderately high: $0.1 < PSI2_{i,9596} \leq 0.26$

High: $PSI2_{i,9596} > 0.26$

7.4.8 Competition

7.4.8.1 Trade competition

As mentioned, this study employs two types of variables to measure the effect of trade competition: import penetration (*IMP*) and the level of trade protection (*NRP* and *ERP*). Table 7.12 present the results when plants are categorised according to the value of *IMP* in the industry where they operate in: low import competition ($IMP_{j,9596}$ between 0 and 0.25); moderate import competition ($IMP_{j,9596}$ between 0.25 and 0.5); high import competition ($IMP_{j,9596}$>0.5).

The table does not provide a clear picture as to how import competition affected performance. First, a U-shaped pattern seems to be suggested for the differences in output and labour productivity, with plants in industries with moderate competition from imports on average the most severely affected by the crisis. Second, there is no pattern for the differences in employment and profitability for the entire period 1998-2000.

Table 7.12 The crisis performance impact by groups of industries' import penetration

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Low import competition	-13.3	-13.8	-9.5	-11.0	-10.5	-10.0	-4.0	-4.1	-2.8
Moderate import competition	-20.9	-22.8	-15.5	-17.7	-19.0	-14.9	-3.9	-4.2	-2.6
High import competition	-12.3	-15.5	-3.7	-9.7	-11.9	-3.9	-4.4	-4.4	-3.8

Table 7.12 continued

Table 7.12 concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups						
Low import competition	-9.5	-9.8	-6.7	-7.9	-7.9	-7.1
Moderate import competition	-15.7	-17.6	-11.1	-7.3	-7.3	-6.5
High import competition	-6.6	-9.9	1.5	-8.8	-8.5	-7.9

Note : Definition of industry import competition groups:

Low import competition: $0 < IMP_{j,9596} \leq 0.25$

Moderate import competition: $0.25 < IMP_{j,9596} \leq 0.5$

High import competition: $IMP_{j,9596} > 0.5$

A mixed picture is also suggested for the effect of trade protection, as shown in Tables 7.13a and 7.13b which evaluate the performance differences across groups of industries with different protection levels. The groups are defined based on NRP (in Table 7.13a) and ERP (in Table 7.13b) as the following:

Low protected industries: ($0< NRP_{j,94} <20$) or ($0< ERP_{j,95} <5$)

Moderately protected industries: ($20< NRP_{j,94} <40$) or ($5< ERP_{j,95} <25$)

Highly protected industries: ($NRP_{j,94} >40$) or ($ERP_{j,95} >25$)

First, consider Table 7.13a. In terms of output (real value added and real gross output), plants in low and highly protected industries were the most severely affected during the peak of the crisis. This observation changes in the early recovery period where plants in low protected industries contracted the most compared to plants in the other groups. A negative relationship is suggested in terms of employment, where the contraction is higher for plants in industries with high rates of nominal protection. This relationship is apparent during the peak crisis as plants in highly protected industries on average shed labour by about 15 per cent. The patterns observed earlier result in a positive relationship for the differences in labour productivity. The contraction in labour productivity decreases as the nominal rates of protection increase. This relationship is particularly evident for the early recovery. Meanwhile, a positive relationship is observed for the differences in profitability. The average contraction in price-cost margin decreases as the industries' nominal rate of protection increases. This pattern is clearly observed for both the crisis peak and the early recovery period.

Turning to Table 7.13b, two main differences are observed. First, a positive relationship is now observed for the differences in output (real value added and real gross output) for the entire period. Second, no clear pattern is suggested from the differences in employment and price-cost margin. Despite these differences, the table shows the same positive relationship regarding the differences in labour productivity.

Table 7.13a The crisis performance impact by groups of industries' trade protection level (based on $NRP_{j,94}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Low protection	-18.9	-20.2	-13.9	-16.1	-16.6	-13.6	-3.6	-3.7	-2.8
Moderate protection	-12.2	-14.1	-6.2	-9.5	-10.3	-6.4	-4.2	-4.3	-3.2
High protection	-21.2	-30.6	-0.9	-27.2	-36.4	-7.5	-12.3	-14.8	-6.7

Table 7.13a continued

Table 7.13a concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups						
Low protection	-14.7	-16.2	-9.7	-9.4	-9.2	-8.3
Moderate protection	-7.5	-9.2	-2.5	-7.5	-7.5	-6.9
High protection	-3.4	-10.1	11.2	-4.4	-4.5	-1.2

Note : Definition of industry import competition groups:

Low protection: $0 < NRP_{j,94} \leq 20$

Moderate protection: $20 < NRP_{j,94} \leq 40$

High protection: $NRP_{j,94} > 40$

Table 7.13b The crisis performance impact by groups of industries' trade protection level (based on $ERP_{j,95}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Low protection	-19.0	-20.0	-15.2	-16.2	-16.2	-15.3	-4.6	-4.9	-3.3
Moderate protection	-16.1	-17.9	-9.4	-13.2	-14.2	-8.9	-3.4	-3.4	-2.7
High protection	-10.0	-12.9	-2.0	-7.7	-9.4	-2.8	-4.1	-4.2	-3.3

Table 7.13b continued

Table 7.13b concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups						
Low protection	-13.4	-14.3	-10.4	-7.9	-8.2	-6.3
Moderate protection	-13.5	-15.1	-8.0	-7.2	-6.7	-6.9
High protection	-4.9	-7.8	2.6	-9.1	-8.8	-8.3

Low protection: $0 < ERP_{j,95} \leq 5$

Moderate protection: $5 < ERP_{j,95} \leq 25$

High protection: $ERP_{j,95} > 25$

7.4.8.2 Product market competition

To examine the effect of competition in the product market, plants are categorised into four groups based on quartiles of the pre-crisis CR4 and HHI distributions:

Competitive industries ($0 < CR4_{j,9596} \leq 0.27$) or ($0 < HHI_{j,9596} \leq 0.03$);

Moderately competitive industries ($0.24 < CR4_{j,9596} \leq 0.44$) or ($0.03 < HHI_{j,9596} \leq 0.1$)

Moderately non-competitive industries ($0.44 < CR4_{j,9596} \leq 0.67$) or $0.1 < HHI_{j,9596} \leq 0.2$);

Non-competitive industries ($CR4_{j,9596} > 0.67$) or ($HHI_{j,9596} > 0.2$).

The results based on CR4 are presented in Table 7.14a. Except for profitability, the table shows that the contraction in performance was larger for plants in more concentrated industries. At this stage, however, it is difficult to confirm whether the suggested relationship is robust. One of the reasons is that there is a substantial difference in the pattern between the peak and the early recovery period. Indeed, the table shows that the relationship becomes less clear in the early recovery period. The same picture can also be observed based on HHI, presented in Table 7.14b. Despite a negative relationship for the entire period 1998-2000, there is a large difference in the pattern between the peak of the crisis and the early recovery.

Table 7.14a The crisis performance impact by concentration (based on $CR4_{j,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Highly competitive	-10.7	-12.4	-5.2	-7.6	-8.3	-4.9	-3.7	-3.7	-2.8
Moderately high competitive	-17.3	-18.4	-12.8	-14.7	-14.8	-12.9	-3.7	-3.9	-2.7
Moderately low competitive	-21.8	-27.9	-6.6	-21.9	-26.2	-11.2	-6.7	-7.2	-5.1
Low competitive	-23.7	-24.1	-21.2	-21.5	-21.9	-18.8	-5.2	-5.1	-4.3

Table 7.14a continued

Table 7.14a concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	19998	1999-2000
Industry groups						
Highly competitive	-6.8	-8.4	-2.0	-7.1	-7.0	-6.4
Moderately high competitive	-12.8	-13.9	-8.9	-10.6	-10.3	-10.1
Moderately low competitive	-12.8	-18.3	1.0	-9.0	-10.2	-4.3
Low competitive	-17.1	-17.5	-15.4	-5.3	-4.3	-7.4

Note : Definition of industry import competition groups:

High competitive: $0 < CR4_{j,9595} \leq 0.27$

Moderately high competitive: $0.27 < CR4_{j,9595} \leq 0.44$

Moderately low competitive: $0.44 < CR4_{j,9595} \leq 0.67$

Low competitive: $CR4_{j,9595} > 0.67$

Table 7.14b The crisis performance impact by concentration (based on $HHI_{j,9596}$)

	$\%\Delta y_{i,t}$								
	Real value added (RVA)			Real gross output (ROUT)			Employment (EMPL)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups									
Highly competitive	-9.0	-10.6	-3.8	-6.6	-7.3	-4.0	-3.5	-3.6	-2.7
Moderately high competitive	-19.3	-20.7	-14.4	-15.4	-15.6	-13.6	-4.1	-4.2	-3.1
Moderately low competitive	-19.0	-23.9	-5.9	-17.9	-21.4	-8.9	-5.3	-5.9	-3.6
Low competitive	-24.7	-25.5	-21.2	-23.3	-23.9	-20.2	-5.6	-5.6	-4.8

Table 7.14b continued

Table 7.14b concluded

	$\%\Delta y_{i,t}$					
	Real value added per labour (RVL)			Price-cost margin (PCM)		
Period	1998-2000	1998	1999-2000	1998-2000	1998	1999-2000
Industry groups						
Highly competitive	-5.1	-6.7	-0.6	-6.4	-6.2	-5.9
Moderately high competitive	-14.6	-16.0	-10.2	-11.3	-11.2	-10.5
Moderately low competitive	-11.9	-16.2	-0.7	-9.6	-10.1	-5.9
Low competitive	-17.7	-18.5	-14.9	-4.7	-4.1	-6.0

Note : Definition of industry import competition groups:

High competitive: $0 < HHI_{j,9595} \leq 0.03$

Moderately high competitive: $0.03 < HHI_{j,9595} \leq 0.1$

Moderately low competitive: $0.1 < HHI_{j,9595} \leq 0.2$

Low competitive: $HHI_{j,9595} > 0.2$

Chapter 8

The role of firm characteristics in shaping firms' responses to the crisis: an econometric analysis

8.1 Introduction

This chapter extends the analysis in the previous chapter to an integrated econometric analysis. This is necessary to ensure whether some of the suggested relationships observed in the descriptive analysis are robust, since it does not take into account the possibility that a plant might share several important characteristics. For example, multinationals are often large, export oriented and located in concentrated industries, and thus the positive effect of foreign ownership observed earlier could have been complicated by the positive effect of sales orientation. Apart from ensuring the findings from the descriptive analysis, an econometric analysis is necessary to take into account the possibility of survival bias and to test whether there is evidence of interrelationships between some of the characteristics.

The remainder of the chapter is divided into four sections. Section 8.2 discuses the statistical framework and econometric procedure. The basic econometric results are presented in Section 8.3. Section 8.4 extends the basic results by considering some interactions between the characteristics. Section 8.5 presents the main findings of the chapter and the previous one.

8.2 Statistical framework and econometric procedure

The general estimating equation is given as follows:

$$\%\Delta y_{i,t} = \alpha + \beta' X_i + \delta' Y_j + \varepsilon_{i,t} \tag{8.1}$$

where $\%\Delta y_{i,t}$ is the percentage difference of the performance measures used in the previous chapter. i and t represent plant i and the period 1997-2000 (i.e. $t = 1997,...,2000$) respectively. X_i and Y_j are sets of explanatory variables capturing the firm characteristics at plant and industry level. A list of the explanatory variables and their expected signs is given in Table 8.1, which represents the hypotheses stated in Section 7.2.

Table 8.1 Summary of the hypothesis and list of explanatory variables

Plant characteristics	Explanatory variables	Expected sign
Size	$SIZE_{i,9596}$	+/-
Age	$AGE_{i,96}$	+/-
Ownership	a. Dummy variables[1]	
	$DFOR_{i,9596}$	+
	$DGOV_{i,9596}$	+/-
	b. Continuous variables	
	$FOR_{i,9596}$	+
	$GOV_{i,9596}$	+/-
Sales orientation	$EXP_{i,9596}$	+
Financial leverage	$LEV_{i,9596}$	-
Import dependency	$IMDEP_{i,9596}$	-
Factor intensity	a. Dummy variables[2]	
	$DCI_{j,9596}$	-
	$DLI_{j,9596}$	-/+
	b. Continuous variables	
	$PCI1_{i,9596}$	-
	$PCI2_{i,9596}$	-
	$PSI1_{i,9596}$	-
	$PSI2_{i,9596}$	-
Industry competition	a. Import competition	
	$IMP_{j,9596}$	+/-
	$NRP_{j,94}$	+/-
	$ERP_{j,95}$	+/-
	b. Product market competition	
	$CR4_{j,9596}$	+/-
	$HHI_{j,9596}$	+/-

Notes: 1. Base dummy variable is $DPRI_{j,9596}$

2. Base dummy variable is $DRI_{j,9596}$

The sample is an unbalanced pooled cross-section which consists of 10,050 plants for the period 1996-2000. About 75 per cent of the sample is made up of plants which are observed for the entire period 1996-2000.

Dummy variables that represent industries, regions and years of the period were included in the equation. Industry and region dummies were introduced to control for differences across industries and regions, respectively. As observed in Chapter 6, there are substantial differences in the performance impact of the crisis across industries. The year dummies were introduced to control for changes in the macro economic situation during the period.

The main limitation of using the pooled cross-section sample is that the unobserved firm characteristics, such as managerial capabilities and product attributes, may not be captured by the explanatory variables. Hence, the estimates might be biased. The way to solve this problem is to introduce a firm specific effect into equation 8.1 and to estimate the equation either by panel data (either fixed- or random- effect) or the dummy variable method. For the estimating equation, the only choice is the dummy variable method, since the panel data methods require some variation in the explanatory variables across years. Unfortunately, regressing the equation by the dummy variable method is not possible because of a computational limitation, that is, about 30,000 dummy variables for plants need to be included in the equation. As a result, no action was taken to eliminate this potential bias (i.e. no specific effects were introduced to the equations). Consequently, one needs to bear this shortcoming in mind and take into account that the estimates may be biased.

An important statistical issue regarding the estimation is sample censoring. The dependent variables ($\%\Delta y_{i,t}$) can only be calculated for the plants observed throughout the period 1995-2000. An Examination of the sample indicated that about 33 per cent of the observed plants were no longer recorded in any year during the period 1997-2000. As a result, the distribution of the sample is truncated and estimating equation 8.1 only on the selected sample may lead to bias. To solve this problem, the Heckman (1976) two-step estimation approach was employed.

To understand the approach, it is necessary to show why estimating equation 8.1 on a truncated distribution might lead to biased estimates, borrowing from Johnston and Dinardo (1997). First, rewrite the equation as

$$\%\Delta y_{i,t} = \alpha + \beta' X_i + \delta' Y_j + \varepsilon_{1i,t} \qquad (8.2)$$

where $\varepsilon_{1i,t}$ is now the error term for observed plant i during the period 1997-2000. It is assumed that the selection of observed plants in this particular period is not random, as the pressure for going into receivership was likely to be high during this period. Thus, survival – in its general form – can be written as

$$S_{i,t} = 1[\gamma' Z_i + \varepsilon_{2i,t} > 0] \tag{8.3}$$

where $S_{i,t} = 1$ if plant i is observed and zero otherwise, and Z_i includes variables that determined the survival, or whether plant i is observed or not. Taking the expectation of 8.2,

$$E(\%\Delta y_{i,t} \mid X_i, Y_j, S_{i,t} = 1) = \alpha + \beta' X_i + \delta' Y_j + E(\varepsilon_{1i,t} \mid \varepsilon_{2i,t} > -\gamma' Z_i) \tag{8.4}$$

and if $\varepsilon_{1i,t}$ and $\varepsilon_{2i,t}$ are jointly normally distributed, a relationship between the two can be written as

$$\varepsilon_{2i,t} = \frac{\sigma_{1,2}}{\sigma_1^2} \varepsilon_{1i,t} + v_{i,t} \tag{8.5}$$

where v_i is uncorrelated with $\varepsilon_{2i,t}$, $\sigma_{1,2}$ is the covariance between $\varepsilon_{1i,t}$ and $\varepsilon_{2i,t}$ and σ_1^2 is the variance of $\varepsilon_{1i,t}$. Thus,

$$\begin{aligned} E(\varepsilon_{1i,t} \mid \varepsilon_{2i,t} > -\gamma' Z_i) &= \frac{\sigma_{1,2}}{\sigma_2} E\left(\frac{\varepsilon_{2i,t}}{\sigma_2} \mid \frac{\varepsilon_{2i,t}}{\sigma_2} > \frac{-\gamma' Z_i}{\sigma_2} \right) \\ &= \frac{\sigma_{1,2}}{\sigma_2} \frac{\phi(\gamma' Z_i / \sigma_2)}{\Phi(\gamma' Z_i / \sigma_2)} \end{aligned} \tag{8.6}$$

where $\phi(.)$ and Φ are the standard normal density and its cumulative distribution function, respectively.

It is now clear why estimating equation 8.2 might lead to biased estimates: the last expression in the equation might not be zero. In other words, the bias is caused by the potential non-zero correlation between $\varepsilon_{1i,t}$ and $\varepsilon_{2i,t}$.

The main problem of estimating equation 8.2 is that the non-random selection process is not controlled. Thus, OLS estimation of the equation suffers from omitted-variable problem and, hence, would produce biased estimates. The omitted variable is reflected in 8.7 and often called the inverse Mills ratio:

$$\frac{\phi(\gamma' Z_i / \sigma_2)}{\Phi(\gamma' Z_i / \sigma_2)} \tag{8.7}$$

The approach that Heckman proposed to solve the selection problem is to include the inverse Mills ratio as another explanatory variable in equation 8.2. This is done in two steps. In the first, a probit model to estimate Z_i is regressed and the estimates of γ / σ_2 for every plant i are obtained to construct the inverse Mills ratio. In the second step, equation 8.2 is regressed with the estimated inverse Mills as an additional regressor. A test for a selectivity problem can be done by evaluating the statistical significance of the estimated coefficient of inverse Mills ratio.

In this study, the process that determines plant survival during the crisis is assumed to be the same as the one that determines the performance impact of the crisis. In other words, the same sets of explanatory variables included in equation 8.2 are included in equation 8.3. Although financial distress is likely to be the main determinants of the survival, Geroski and Gregg (1997) and Schary (1991) pointed out that the decision to put a firm into receivership may be constrained by firm characteristics, such as size (Jovanovic 1982; Ghemawat and Nalebuff 1985), age (Jovanovic 1982) and financial leverage (Jones 1987; Schary 1991).

8.3 Econometric results[1]

The regression results relating to the plant- and industry-specific determinants of the performance impact of the crisis are reported in Table 8.2. They are the results from OLS estimation of the second stage of the Heckman selection model, using the percentage difference of all performance measures (real value added, real gross output, employment, real value added per labour and price-cost margin) as the dependent variables.

[1] Unless otherwise stated, the results are computed by the author from the data base.

The F-test for overall statistical significance passes at the 1 per cent level. Meanwhile, the White's robust F- and t-statistics were used to correct for heteroscedasticity. Graphical examination and heteroscedasticity tests (Cook-Weisberg and White) at the experimental stage reveal that the variance is not homogenous.

The results presented in the table have been controlled for the presence of outliers. The examination for the presence of outliers was done in the experimental stage using the Hadi (1992) method. Introducing a dummy variable which identifies the outliers improved the results as it helps the results pass the Pregibon (1980) specification test (commonly known as the *link-test*), even though it was not able to pass the results from Ramsey's specification test (i.e. RESET test). Therefore, the concern that the estimates may be biased – as a result of the limitation in the methodology to control for unobserved factors – can be reduced. Despite this, the results of the equations for price-cost margin do not pass both specification tests. This situation persists even when some form of independent variables were introduced instead of the linear ones. This suggests the extent of the equations in omitting some important variables is quite large. Accordingly, the chance for biased estimates in these equations may be higher than for the other equations.

$SIZE_{9596}$ and AGE_{9596} were introduced in their natural logarithm form. There are two reasons for this. First, and this is particularly for $SIZE_{9596}$, previous studies often found that firm size is non-linearly related to performance. Second, introducing the variables in their natural logarithm form significantly improved the model fit and specification tests.

Several alternative specifications were tried, four of which are displayed in the table. The first included only all plant-level variables, while the second and the third subsequently added the industry-level factor intensity variables (DLI_{9596} and DCI_{9596}) and competition variables ($CR4_{9596}$, IMP_{9596} and ERP_{9596}). Adding the competition variables in the third specification slightly complicates the picture. The coefficients of DLI_{9596} change sign from negative to positive and become less statistically significant in several equations across the performance measures. This suggests much of the negative effect of being in capital-intensive industries is picked up by the competition variables. For this reason, the fourth specification experimented by excluding the industry-level factor intensity variables. The specification improves the results as they now depict a more consistent relationship for the competition variables and give slightly higher F-statistics. Accordingly, the discussion is based on the results of the fourth specification.

In the experimental stage, industry dummy variables were introduced progressively from two-digit to four-digit level of ISIC. The results are reported at four-digit level. Introducing the dummies at four-digit level significantly improved the model fit compared to that at the two-digit level. It also serves as an informal way to control for the unobserved factors. It can be argued that plants within an industry at this digit level might share some similar characteristics because the classification is quite detailed. Meanwhile, region dummy variables were defined at province level.

Although it is common to find low R^2 from cross section regressions, the results show R^2 are rather low compared to those commonly found in plant-level studies. This suggests a lack of explanatory variables in the model, which is consistent with the results of Ramsey's RESET tests. Nevertheless, the low R^2 does not necessarily mean the model is bad. As pointed out by Gujarati (1995), there should be more concern with the theoretical relevance or logic of the relationship between explanatory and dependent variables rather than the low value of R^2.

The coefficients of inverse Mills ratio are statistically significant in most of the equations apart from those for real value added. As explained, this finding implies that the disturbances in the performance and survival difference equation, i.e. equation 8.2 and 8.3, respectively, are correlated and without a correction the estimates are expected to be biased. The evidence on the survival bias points to the limitation of previous studies (e.g. Dwor-Frecaut et al. 2000) as they based the analysis only on the observed firms or plants.

The use of the alternative measures of some explanatory variables ($PCI1_{9596}$, $PSI1_{9596}$, HHI_{9596} and NRP_{94}) yielded similar results. The results are presented in Appendix 8.2. Based on the overall statistical significant (F-test), the discussion is based on the estimates of $CR4_{9596}$, $PCI2_{9596}$, $PSI2_{9596}$ and ERP_{95}.

Table 8.2 The determinants of performance impact of the crisis: regression results

Dependent variable	%ΔRVA$_{i,t}$				%ΔROUT$_{i,t}$	
Specification	8.1	8.2	8.3	8.4	8.5	8.6
log(SIZE$_{i,9596}$)	-0.022 (1.74)+	-0.022 (1.71)+	-0.020 (1.49)	-0.020 (1.46)	0.025 (2.68)**	0.024 (2.57)*
log(AGE$_{i,9596}$)	-0.077 (7.77)**	-0.076 (7.65)**	-0.076 (7.58)**	-0.076 (7.59)**	-0.046 (6.03)**	-0.047 (6.01)**
FOR$_{i,9596}$	0.229 (5.61)**	0.230 (5.62)**	0.250 (5.98)**	0.251 (6.00)**	0.214 (7.13)**	0.214 (7.12)**
GOV$_{i,9596}$	0.037 (0.94)	0.037 (0.94)	0.036 (0.90)	0.035 (0.89)	0.089 (3.29)**	0.090 (3.32)**
EXP$_{i,9596}$	0.184 (6.16)**	0.181 (6.04)**	0.198 (6.29)**	0.197 (6.26)**	0.164 (6.80)**	0.162 (6.66)**
LEV$_{i,9596}$	0.002 (0.81)	0.002 (0.81)	0.002 (0.76)	0.002 (0.76)	-0.003 (1.14)	-0.003 (1.14)
IMDEP$_{i,9596}$	0.069 (2.41)*	0.069 (2.43)*	0.071 (2.48)*	0.071 (2.47)*	0.034 (1.52)	0.034 (1.52)
PCI2$_{i,9596}$ [(a)]	-0.384 (1.94)+	-0.387 (1.95)+	-0.406 (2.02)*	-0.407 (2.02)*	-0.609 (4.69)**	-0.609 (4.68)**
PSI2$_{i,9596}$	-0.028 (3.17)**	-0.028 (3.16)**	-0.029 (3.21)**	-0.029 (3.23)**	-0.029 (3.82)**	-0.029 (3.80)**
DLI$_{j,9596}$		0.045 (0.86)	0.369 (1.86)+			0.025 (0.57)
DCI$_{j,9596}$		-0.192 (1.42)	0.071 (0.34)			-0.276 (2.48)*
CR4$_{j,9596}$			0.013 (0.05)	-0.044 (0.16)		
IMP$_{j,9596}$			0.008 (2.12)*	0.008 (2.28)*		
ERP$_{j,95}$ [(a)]			-0.349 (1.75)+	-0.277 (1.32)		
Mills ratio	-0.052 (0.54)	-0.047 (0.48)	-0.041 (0.41)	-0.039 (0.39)	0.276 (3.57)**	0.269 (3.45)**
Year dummy 1998	-0.207 (11.84)**	-0.207 (11.86)**	-0.215 (11.92)**	-0.215 (11.92)**	-0.186 (13.66)**	-0.185 (13.57)**
Year dummy 1999	-0.232 (11.18)**	-0.233 (11.20)**	-0.240 (11.17)**	-0.240 (11.17)**	-0.336 (20.72)**	-0.335 (20.57)**
Year dummy 2000	-0.143 (5.78)**	-0.144 (5.81)**	-0.147 (5.74)**	-0.147 (5.75)**	-0.235 (12.25)**	-0.234 (12.11)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	0.370 (2.06)*	0.366 (2.04)*	0.324 (1.48)	0.356 (1.64)	-0.144 (1.11)	-0.134 (1.03)
R-squared	0.05	0.05	0.05	0.05	0.07	0.07
F-statistics	14.55	14.34	14.04	14.24	22.36	21.99
Specification tests						
Ramsey RESET	Pass	Pass	Pass	Pass	Not Pass	Not Pass
Pregibon LINK test	Pass	Pass	Pass	Pass	Pass	Pass

Table 8.2 continued

Dependent variable	$\%\Delta ROUT_{i,t}$		$\%\Delta EMPL_{i,t}$			
Specification	8.7	8.8	8.9	8.10	8.11	8.12
$\log(SIZE_{i,9596})$	0.025	0.026	-0.025	-0.026	-0.029	-0.029
	(2.50)*	(2.58)**	(4.88)**	(4.94)**	(4.97)**	(4.99)**
$\log(AGE_{i,9596})$	-0.043	-0.043	-0.036	-0.036	-0.036	-0.036
	(5.51)**	(5.50)**	(9.23)**	(9.14)**	(8.84)**	(8.90)**
$FOR_{i,9596}$	0.212	0.213	0.083	0.084	0.084	0.084
	(6.87)**	(6.91)**	(5.64)**	(5.67)**	(5.46)**	(5.47)**
$GOV_{i,9596}$	0.093	0.092	0.042	0.043	0.044	0.044
	(3.41)**	(3.39)**	(2.11)*	(2.13)*	(2.14)*	(2.14)*
$EXP_{i,9596}$	0.179	0.177	0.081	0.079	0.081	0.080
	(7.02)**	(6.94)**	(6.77)**	(6.59)**	(6.39)**	(6.38)**
$LEV_{i,9596}$	-0.003	-0.003	-0.001	-0.001	-0.001	-0.001
	(1.14)	(1.14)	(1.61)	(1.62)	(1.65)+	(1.65)+
$IMDEP_{i,9596}$	0.048	0.048	0.051	0.052	0.058	0.057
	(2.13)*	(2.13)*	(4.78)**	(4.79)**	(5.24)**	(5.23)**
$PCI2_{i,9596}{}^{(a)}$	-0.621	-0.622	0.662	0.660	0.669	0.668
	(4.69)**	(4.70)**	(7.65)**	(7.64)**	(7.55)**	(7.55)**
$PSI2_{i,9596}$	-0.029	-0.029	-0.035	-0.035	-0.035	-0.035
	(3.83)**	(3.87)**	(5.47)**	(5.45)**	(5.35)**	(5.35)**
$DLI_{j,9596}$	0.524			0.038	0.116	
	(2.59)**			(1.63)	(1.69)+	
$DCI_{j,9596}$	0.130			-0.129	-0.034	
	(0.65)			(2.33)*	(0.41)	
$CR4_{j,9596}$	0.006	-0.073			-0.347	-0.380
	(0.02)	(0.30)			(3.39)**	(3.66)**
$IMP_{j,9596}$	0.010	0.011			0.004	0.004
	(2.95)**	(3.19)**			(2.75)**	(2.91)**
$ERP_{j,95}{}^{(a)}$	-0.386	-0.287			-0.002	0.021
	(2.48)*	(1.70)+			(0.03)	(0.30)
Mills ratio	0.296	0.302	0.229	0.227	0.223	0.221
	(3.68)**	(3.76)**	(5.55)**	(5.46)**	(5.01)**	(4.96)**
Year dummy 1998	-0.194	-0.195	-0.064	-0.064	-0.065	-0.065
	(13.79)**	(13.83)**	(9.21)**	(9.17)**	(8.90)**	(8.87)**
Year dummy 1999	-0.347	-0.347	-0.065	-0.065	-0.066	-0.066
	(20.55)**	(20.59)**	(7.65)**	(7.59)**	(7.34)**	(7.30)**
Year dummy 2000	-0.243	-0.244	-0.065	-0.064	-0.064	-0.064
	(12.18)**	(12.23)**	(6.30)**	(6.24)**	(5.90)**	(5.86)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	-0.189	-0.149	0.127	0.132	0.356	0.379
	(1.10)	(0.86)	(1.99)*	(2.06)*	(4.56)**	(4.82)**
R-squared	0.07	0.07	0.07	0.07	0.07	0.07
F-statistics	21.13	21.34	16.69	16.44	15.64	15.86
Specification tests						
Ramsey RESET	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass
Pregibon LINK test	Pass	Pass	Pass	Pass	Pass	Pass

Table 8.2 continued

Table 8.2 concluded

Dependent variable	$\%\Delta RVL_{i,t}$				$\%\Delta PCM_{i,t}$			
Specification	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20
$\log(SIZE_{i,9596})$	0.001 (0.06)	0.002 (0.13)	0.006 (0.43)	0.006 (0.46)	0.016 (2.00)*	0.017 (2.12)*	0.016 (1.93)+	0.016 (1.92)+
$\log(AGE_{i,9596})$	-0.043 (4.37)**	-0.042 (4.28)**	-0.042 (4.18)**	-0.042 (4.16)**	-0.013 (1.55)	-0.012 (1.45)	-0.015 (1.80)+	-0.015 (1.77)+
$FOR_{i,9596}$	0.145 (3.67)**	0.145 (3.67)**	0.167 (4.12)**	0.168 (4.14)**	0.100 (3.52)**	0.101 (3.56)**	0.115 (3.91)**	0.115 (3.92)**
$GOV_{i,9596}$	-0.031 (0.75)	-0.032 (0.76)	-0.033 (0.78)	-0.033 (0.78)	-0.104 (2.25)*	-0.104 (2.25)*	-0.101 (2.15)*	-0.102 (2.18)*
$EXP_{i,9596}$	0.096 (3.32)**	0.096 (3.28)**	0.110 (3.60)**	0.110 (3.57)**	0.056 (2.25)*	0.052 (2.10)*	0.058 (2.24)*	0.058 (2.24)*
$LEV_{i,9596}$	0.003 (1.79)+	0.003 (1.79)+	0.003 (1.74)+	0.003 (1.74)+	-0.001 (0.57)	-0.001 (0.55)	-0.001 (0.64)	-0.001 (0.64)
$IMDEP_{i,9596}$	0.021 (0.79)	0.022 (0.81)	0.018 (0.67)	0.018 (0.67)	-0.031 (1.35)	-0.030 (1.30)	-0.040 (1.72)+	-0.040 (1.73)+
$PCI2_{i,9596}{}^{(a)}$	-1.027 (4.79)**	-1.029 (4.80)**	-1.054 (4.84)**	-1.054 (4.84)**	-0.280 (2.72)**	-0.283 (2.74)**	-0.318 (3.03)**	-0.318 (3.03)**
$PSI2_{i,9596}$	-0.002 (0.19)	-0.002 (0.19)	-0.003 (0.26)	-0.003 (0.28)	-0.025 (2.43)*	-0.024 (2.40)*	-0.024 (2.36)*	-0.024 (2.37)*
$DLI_{j,9596}$		0.010 (0.20)	0.258 (1.55)			0.071 (1.57)	0.040 (0.29)	
$DCI_{j,9596}$		-0.024 (0.16)	0.142 (0.77)			-0.210 (1.09)	-0.288 (1.51)	
$CR4_{j,9596}$			0.398 (1.40)	0.385 (1.38)			0.614 (2.26)*	0.511 (1.90)+
$IMP_{j,9596}$			0.004 (1.06)	0.004 (1.16)			-0.002 (0.35)	-0.002 (0.29)
$ERP_{j,95}{}^{(a)}$			-0.396 (2.03)*	-0.347 (1.74)+			-0.231 (0.84)	-0.222 (0.80)
Mills ratio	-0.289 (2.96)**	-0.280 (2.86)**	-0.271 (2.68)**	-0.268 (2.64)**	-0.219 (2.72)**	-0.214 (2.67)**	-0.266 (3.24)**	-0.257 (3.13)**
Year dummy 1998	-0.142 (8.23)**	-0.143 (8.26)**	-0.148 (8.32)**	-0.149 (8.34)**	-0.014 (0.97)	-0.015 (1.01)	-0.012 (0.78)	-0.012 (0.84)
Year dummy 1999	-0.166 (8.06)**	-0.167 (8.10)**	-0.173 (8.06)**	-0.173 (8.08)**	-0.030 (1.66)+	-0.030 (1.70)+	-0.023 (1.28)	-0.025 (1.35)
Year dummy 2000	-0.077 (3.11)**	-0.079 (3.17)**	-0.081 (3.15)**	-0.082 (3.17)**	-0.036 (1.75)+	-0.037 (1.79)+	-0.026 (1.20)	-0.027 (1.28)
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included	Included	Included
Constant	0.275 (1.48)	0.264 (1.43)	-0.022 (0.10)	-0.019 (0.08)	0.294 (1.88)+	0.293 (1.88)+	-0.029 (0.14)	0.023 (0.11)
R-squared	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02
F-statistics	12.13	11.90	11.79	11.98	4.67	4.63	4.44	4.50
Specification tests								
Ramsey RESET	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass	Not Pass
Pregibon LINK test	Pass	Pass	Pass	Pass	Not Pass	Not Pass	Not Pass	Not Pass

Notes:

1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 10^3 to improve presentation.

To assist the discussion, the results of the preferred specification were rewritten in Table 8.3.

Like those from descriptive analysis, the results in the table give mixed evidence on the effect of size. The coefficients of $\log(SIZE_{9596})$ are positive in the equations for output (real gross output), labour productivity and profitability but negative for real value added and employment. For the positive coefficients, only those related to real gross output and price cost margin are statistically significant while for the negative ones, only that related to employment is statistically significant.

The results give only weak support to the inference from the descriptive analysis that large firms seem to have strongly improved their efficiency in responding to the crisis. Earlier it was shown that the contraction in labour productivity decreases as size increases (i.e. positively related). The coefficient of $\log(SIZE_{9596})$ in the equation for labour productivity, although positive, is not statistically significant and has a very low t-statistic. This finding suggests the inference from the descriptive analysis does not necessarily apply to all large firms. According to the labour hoarding hypothesis (Oi 1962), one possible explanation is that the adjustment in employment is likely to depend on factor intensity, where the tendency to hoard labour is likely to be higher in firms with high capital intensity or employing many skilled workers. It turns out that the descriptive results support this explanation. Based on plant-level factor intensity variables ($PCI1, PCI2, PSI1, PSI2$), it was found earlier that contraction in employment is lower in capital-intensive plants or plants possessing more skilled employees.

The results confirm the earlier negative relationship between firm age and contraction in performance, which does not lend any support for *Hypothesis 2*. Thus, younger firms are suggested to have performed better than older ones. The coefficients of $\log(AGE_{9596})$ are consistently negative and statistically significant across all equations, albeit there is a weak statistical significance in the equation for profitability. This finding might indicate only younger firms benefited from higher exports due to the exchange rate depreciation. It supports the argument made by Ramstetter (1999, p.52) that younger plants in the industry may be more inclined to participate in international trade because they were established when the policy environment is more open. As described in Chapter 2, policies to promote exports had only begun to be applied in the mid 1980s.

Table 8.3 The determinants of performance impact of the crisis: selected regression results

Dependent variable	%ΔRVA$_{i,t}$	%ΔROUT$_{i,t}$	%ΔEMPL$_{i,t}$	%ΔRVL$_{i,t}$	%ΔPCM$_{i,t}$
Specification	8.4	8.8	8.12	8.16	8.20
log(SIZE$_{i,9596}$)	-0.020 (1.46)	0.026 (2.58)**	-0.029 (4.99)**	0.006 (0.46)	0.016 (1.92)+
log(AGE$_{i,9596}$)	-0.076 (7.59)**	-0.043 (5.50)**	-0.036 (8.90)**	-0.042 (4.16)**	-0.015 (1.77)+
FOR$_{i,9596}$	0.251 (6.00)**	0.213 (6.91)**	0.084 (5.47)**	0.168 (4.14)**	0.115 (3.92)**
GOV$_{i,9596}$	0.035 (0.89)	0.092 (3.39)**	0.044 (2.14)*	-0.033 (0.78)	-0.102 (2.18)*
EXP$_{i,9596}$	0.197 (6.26)**	0.177 (6.94)**	0.080 (6.38)**	0.110 (3.57)**	0.058 (2.24)*
LEV$_{i,9596}$	0.002 (0.76)	-0.003 (1.14)	-0.001 (1.65)+	0.003 (1.74)+	-0.001 (0.64)
IMDEP$_{i,9596}$	0.071 (2.47)*	0.048 (2.13)*	0.057 (5.23)**	0.018 (0.67)	-0.040 (1.73)+
PCI2$_{i,9596}$$^{(a)}$	-0.407 (2.02)*	-0.622 (4.70)**	0.668 (7.55)**	-1.054 (4.84)**	-0.318 (3.03)**
PSI2$_{i,9596}$	-0.029 (3.23)**	-0.029 (3.87)**	-0.035 (5.35)**	-0.003 (0.28)	-0.024 (2.37)*
CR4$_{j,9596}$	-0.044 (0.16)	-0.073 (0.30)	-0.380 (3.66)**	0.385 (1.38)	0.511 (1.90)+
IMP$_{j,9596}$	0.008 (2.28)*	0.011 (3.19)**	0.004 (2.91)**	0.004 (1.16)	-0.002 (0.29)
ERP$_{j,95}$$^{(a)}$	-0.277 (1.32)	-0.287 (1.70)+	0.021 (0.30)	-0.347 (1.74)+	-0.222 (0.80)
Mills ratio	-0.039 (0.39)	0.302 (3.76)**	0.221 (4.96)**	-0.268 (2.64)**	-0.257 (3.13)**
Year dummy 1998	-0.215 (11.92)**	-0.195 (13.83)**	-0.065 (8.87)**	-0.149 (8.34)**	-0.012 (0.84)
Year dummy 1999	-0.240 (11.17)**	-0.347 (20.59)**	-0.066 (7.30)**	-0.173 (8.08)**	-0.025 (1.35)
Year dummy 2000	-0.147 (5.75)**	-0.244 (12.23)**	-0.064 (5.86)**	-0.082 (3.17)**	-0.027 (1.28)
Dummy variables for provinces	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included
Constant	0.356 (1.64)	-0.149 (0.86)	0.379 (4.82)**	-0.019 (0.08)	0.023 (0.11)
R-squared	0.05	0.07	0.07	0.04	0.02
F-statistics	14.24	21.34	15.86	11.98	4.50
Specification tests					
Ramsey RESET	Pass	Not Pass	Not Pass	Not Pass	Not Pass
Pregibon LINK test	Pass	Pass	Pass	Pass	Not Pass

Notes:
1) Robust t statistics in parentheses.
2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) The coefficient was multiplied by 10^3 to improve presentation.

There is strong evidence on the positive effect of foreign ownership, supporting *Hypothesis 3B* and confirming the finding from the descriptive analysis that plants with a higher foreign share responded better to the crisis. The coefficients of FOR_{9596} are positive and statistically significant across all equations. In addition, the magnitude of the coefficients suggests the effect of foreign ownership is economically important. A 10 per cent increase in foreign share leads to a smaller performance contraction by 12 per cent in real gross output, 12 per cent in real value added, 11 per cent in employment, 11 per cent in labour productivity and 8 per cent in profitability.

These results provide support for the theoretical explanation concerning the positive effect of foreign ownership. It was argued that multinationals might have responded better than domestic firms because they could have been provided with financial assistance by their parents or were able to take advantage of the boost in competitiveness from the sharp exchange rate depreciation. However, at this stage it is not clear whether only one of these explanations dominates or both are important. An attempt to shed some light on this issue is provided in Section 8.4.

As for government ownership, the results provide some evidence consistent with the notion of limited support from government in protecting these companies. The coefficients of GOV_{9596} indicate the contraction in profitability and labour productivity was larger for plants with a high government ownership share. Despite this, the results indicate that to some extent the government exercised its power to ensure firms shed less labour. The coefficient of GOV_{9596} is positive in the equation for employment which suggests the contraction in employment was lower for plants with a high government ownership share.

However, the indication contradicts the results of the equation for real gross output, which show a positive and statistically significant GOV_{9596} coefficient. This ambiguous finding perhaps reflects the low government ownership share in many Indonesian manufacturing plants in the mid 1990s. As described in Chapter 2, some major investment deregulations had been undertaken since the early part of the decade.

The results show a robust finding that export oriented plants performed better than domestic oriented ones, supporting *Hypothesis 4*. The coefficients of EXP_{9596} are consistently positive and statistically significant across the equations. As with foreign ownership, the effect of sales orientation is economically important. A 10 per cent increase in exported output (as a ratio to total output) lowers the performance contraction by 9 per cent in real gross output, 10 per cent in real value added, 11 per cent in employment, 7 per cent in labour productivity and 4 per cent in profitability.

The finding agrees with the theoretical prediction on the positive impact of exchange rate depreciation and supports similar findings from other studies (e.g. Forbes 2000b; Bappenas 2000; Blalock and Gertler 2005).

Even so, the positive impact of sales orientation is expected to be different between the peak of the crisis and the early recovery period. As described in Chapter 3, the increase in competitiveness in 1998 did not last long, as a nominal appreciation took place in 1999 and 2000.

Plants that use large imported input are demonstrated to have responded well to the crisis. The coefficients of $IMDEP_{9596}$ are positive in the equation for output, employment and labour productivity and most are statistically significant. These results do not support *Hypothesis 6* and the theory that a high share of imported input outweighs the increased competitiveness from exchange rate depreciation. It is only in the equations for profitability that the coefficient supports the hypothesis: it is negative and very statistically significant.

There are two possible reasons for this. First, the effect of $IMDEP_{9596}$ might have been captured by the variables that represent factor intensity, since capital-intensive firms commonly intensively use imported inputs. However, the results presented in Appendix 8.2 do not support this explanation. The sign of the coefficients does not change when the equations are specified without the factor intensity variables. Second, the effect of import dependency might have varied between the peak of the crisis and early recovery and/or depended on sales orientation. As noted, some nominal exchange rate appreciation took place in 1999-2000. Meanwhile, the interrelationship between sales orientation might have been possible because higher costs for imported input due to the exchange rate depreciation could be matched by higher export revenues.

The results do not provide a clear picture on the effect of firm financial leverage and whether it was important in shaping the firms' responses. The coefficients of LEV_{9596} are evenly divided between positive and negative across the equations and only a few are statistically significant, not to mention only at the 10 per cent level. Therefore, the results do not support the theoretical explanation on the negative impact of leverage that works through the balance sheet effect and bank lending channel. Moreover, they do not support the results from previous studies. For example Claessens et al. (2000) found a negative relationship between leverage and profit margin during the peak of the crisis for firms in the crisis-affected countries.

There are at least four explanations for the mixed results. First, the proxy for leverage used in this study is very approximate.[2] Second, the proxy is not able to differentiate between short- and long-term debt. Long-term debt might change the results as it might increase the possibility for postponing increased interest payments. Third, much of the effect of leverage might have been taken by other variables, namely size and age. Larger and older firms are likely to have been more successful in arranging debt or interest repayment with lenders, because they have more reputation and credibility in the view of lenders compared with small or younger firms. Finally, the effect of leverage might have depended on the other firm characteristics. The test of this general hypothesis is presented in Section 8.4.

The results support the earlier observations in the descriptive analysis on the importance of factor intensity. $PCI2_{9596}$ and $PSI2_{9596}$ are negatively related to the difference in output, labour productivity and profitability, and most of the variable coefficients are statistically significant. Thus, the results indicate the contraction in output, labour productivity and profitability was higher for plants which are capital intensive and employ high levels of skilled labour. This finding strongly supports *Hypothesis 7B* and *7C*.

The negative coefficients of $PCI2_{9596}$ agree with the theory that exchange rate depreciation improves the competitiveness of firms in depreciating countries by lowering relative labour costs. Meanwhile, the positive coefficient of $PCI2_{9596}$ in the equation for employment is consistent with the labour hoarding hypothesis (Oi 1962). It implies the contraction in employment was lower for plants which are capital intensive. This finding is also consistent with those from previous studies. Manning (2000) indicated that adjustment to the crisis in

[2] See the discussion on the proxy for financial leverage in Section 7.3.

the Indonesian labour market works through the adjustment in wages rather than in employment. Meanwhile, Dwor-Frecaut et al. (2000) found there were manufacturing firms that experienced a large fall in capacity utilisation rate during the peak of the crisis but was accompanied by only a small contraction rate in employment.

A similar conclusion can be derived when the factor intensity variables are represented by industry-level variables (DRI_{9596}, DLI_{9596} and DCI_{9596}) (see specification 8.2, 8.6, 8.10, 8.14 and 8.18 in Table 8.2). After controlling for other plant characteristics, on average, plants in capital intensive industries contracted more than plants in resource-intensive industries. This is shown by the negative coefficients of DCI_{9596} in all equations, even though only a few are statistically significant (DRI_{9596} here is used as the base dummy variable). The positive coefficients of DLI_{9596} in the equations suggest plants in labour-intensive industries performed better than plants in resource-intensive industries. Nevertheless, none of them is statistically significant, which suggests performance of plants in these two industries was relatively similar.

The results provide inconsistent estimates regarding the $CR4_{9596}$ variable. The coefficients are negative in the equations for output and employment but positive in the equations for labour productivity and profitability. Despite these inconsistent estimates, the negative coefficients point to a suggestion that firms did not, or perhaps were not able to, exercise market power in responding to the crisis. This provides support for the theory that collusive agreements tend to break down during low demand situations.

It is important to note that the positive $CR4_{9596}$ coefficient in the equation for profitability might have been brought about by the weakness of price-cost margin as a proxy for profitability. As discussed in Chapter 6, price-cost margin is more appropriate for use in models explaining market power, and in these models, theory predicts that industry concentration and price-cost margin is positively related. Thus, what was observed might not reflect the true relationship between concentration and the difference in profitability, and instead might reflect the relationship between concentration and market power.

In contrast to the inference derived in the descriptive analysis, there is now a clearer picture on the effect of competition from imports. First, the performance of plants in industries with low import competition is indicated to have been adversely affected by the crisis. IMP_{9596} is positively related to the performance difference in all equations except that for profitability, and most of these coefficients are statistically significant.

Second, the results suggest the performance of plants in protected industries was more adversely affected by the crisis than those in less protected industries. The coefficients of ERP_{95} are negative in all equations but only two are statistically significant (in the equation for real value added and real value added per labour), even though only at the 10 per cent level. This finding is consistent with the previous finding on IMP_{9596} and hence supports the X-inefficiency hypothesis which predicts that firms in less competitive industries tend to operate less efficiently as a result of high managerial slackness.

Table 8.4 presents the results of alternative specifications using the dummy ownership variables ($DPRI_i$, $DFOR_i$ and $DSOE_i$). Two specifications have been used for every difference equation: first, all continues ownership-variables are replaced by dummy ownership-variables and second, an interaction variable between dummy for foreign plants ($DFOR_i$) and the share of foreign ownership (FOR_i) is added to the first specification. $DPRI_i$ is used as the base dummy variable. In the first specification, the coefficients of $DFOR_i$ and $DSOE_i$ give the difference in the average performance expansion (contraction) of foreign and government plants, respectively, relative to domestic-private plants for the 1998-2000 period. The first specification serves as a kind of robustness test for the results presented earlier in Table 8.3 while the second specification serves as a test for *Hypothesis 3C.* The coefficients of the interaction variable in the second specification give estimates of the large relative differences in the expansion (contraction) across plants with different foreign ownership shares.

Table 8.4 The determinants of performance impact of the crisis: regression results using dummy ownership variables

Dependent variable	$\%\Delta RVA_{i,t}$		$\%\Delta ROUT_{i,t}$		$\%\Delta EMPL_{i,t}$	
Specification	8.21	8.22	8.23	8.24	8.25	8.26
$\log(SIZE_{i,9596})$	-0.021 (1.55)	-0.019 (1.43)	0.025 (2.48)*	0.026 (2.56)*	-0.029 (4.95)**	-0.029 (4.96)**
$\log(AGE_{i,9596})$	-0.078 (7.80)**	-0.077 (7.66)**	-0.045 (5.71)**	-0.044 (5.59)**	-0.036 (8.89)**	-0.036 (8.90)**
$DFOR_{i,9596}$	0.144 (4.78)**	-0.221 (2.64)**	0.124 (5.59)**	-0.181 (2.62)**	0.053 (4.98)**	-0.032 (1.12)
$DFOR_{i,9596}*FOR_{i,9596}$		0.535 (4.58)**		0.448 (4.66)**		0.126 (3.02)**
$DGOV_{i,9596}$	0.053 (1.55)	0.050 (1.47)	0.108 (4.57)**	0.105 (4.47)**	0.037 (2.09)*	0.037 (2.06)*
$EXP_{i,9596}$	0.210 (6.69)**	0.191 (6.06)**	0.189 (7.43)**	0.172 (6.74)**	0.085 (6.75)**	0.080 (6.32)**
$LEV_{i,9596}$	0.002 (0.72)	0.002 (0.81)	-0.003 (1.17)	-0.003 (1.10)	-0.001 (1.70)+	-0.001 (1.63)
$IMDEP_{i,9596}$	0.081 (2.80)**	0.078 (2.68)**	0.057 (2.48)*	0.054 (2.36)*	0.059 (5.38)**	0.058 (5.30)**
$PCI2_{i,9596}{}^{(a)}$	-0.412 (2.04)*	-0.370 (1.83)+	-0.620 (4.70)**	-0.589 (4.44)**	0.665 (7.49)**	0.675 (7.60)**
$PSI2_{i,9596}$	-0.029 (3.30)**	-0.029 (3.26)**	-0.030 (4.03)**	-0.030 (3.99)**	-0.035 (5.41)**	-0.035 (5.39)**
$CR4_{j,9596}$	-0.036 (0.13)	-0.037 (0.13)	-0.064 (0.26)	-0.061 (0.25)	-0.382 (3.68)**	-0.378 (3.64)**
$IMP_{j,9596}$	0.008 (2.28)*	0.008 (2.26)*	0.011 (3.18)**	0.011 (3.16)**	0.004 (2.90)**	0.004 (2.89)**
$ERP_{j,95}{}^{(a)}$	-0.281 (1.33)	-0.256 (1.22)	-0.291 (1.72)+	-0.270 (1.60)	0.017 (0.25)	0.0234 (0.34)
Mills ratio	-0.043 (0.44)	-0.048 (0.49)	0.298 (3.73)**	0.292 (3.64)**	0.224 (5.03)**	0.219 (4.93)**
Year dummy 1998	-0.214 (11.91)**	-0.214 (11.89)**	-0.194 (13.82)**	-0.194 (13.77)**	-0.065 (8.92)**	-0.065 (8.85)**
Year dummy 1999	-0.240 (11.18)**	-0.239 (11.14)**	-0.347 (20.61)**	-0.346 (20.53)**	-0.066 (7.35)**	-0.066 (7.28)**
Year dummy 2000	-0.146 (5.74)**	-0.146 (5.71)**	-0.243 (12.23)**	-0.242 (12.16)**	-0.064 (5.91)**	-0.064 (5.84)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	0.365 (1.68)+	0.359 (1.66)+	-0.140 (0.81)	-0.144 (0.83)	0.379 (4.82)**	0.380 (4.84)**
R-squared F-statistics	0.05 14.17	0.05 14.15	0.07 21.36	0.07 21.26	0.07 15.9	0.07 15.76

Table 8.4 continued

Table 8.4 concluded

Dependent variable	%ΔRVL$_{i,t}$		%ΔPCM$_{i,t}$	
Specification	8.27	8.28	8.29	8.30
log(SIZE$_{i,9596}$)	0.005 (0.38)	0.007 (0.49)	0.015 (1.82)+	0.016 (1.85)+
log(AGE$_{i,9596}$)	-0.044 (4.35)**	-0.042 (4.22)**	-0.015 (1.87)+	-0.015 (1.85)+
DFOR$_{i,9596}$	0.091 (3.11)**	-0.187 (2.38)*	0.081 (3.95)**	0.025 (0.44)
DFOR$_{i,9596}$*FOR$_{i,9596}$		0.407 (3.74)**		0.082 (1.02)
DGOV$_{i,9596}$	-0.009 (0.26)	-0.012 (0.33)	-0.076 (2.00)*	-0.077 (2.00)*
EXP$_{i,9596}$	0.119 (3.89)**	0.104 (3.39)**	0.061 (2.37)*	0.058 (2.22)*
LEV$_{i,9596}$	0.003 (1.71)+	0.003 (1.80)+	-0.001 (0.67)	-0.001 (0.65)
IMDEP$_{i,9596}$	0.027 (0.97)	0.024 (0.87)	-0.040 (1.72)+	-0.041 (1.75)+
PCI2$_{i,9596}$$^{(a)}$	-1.058 (4.85)**	-1.025 (4.68)**	-0.324 (3.09)**	-0.321 (3.04)**
PSI2$_{i,9596}$	-0.003 (0.28)	-0.003 (0.27)	-0.024 (2.36)*	-0.024 (2.36)*
CR4$_{j,9596}$	0.393 (1.41)	0.388 (1.40)	0.511 (1.90)+	0.511 (1.90)+
IMP$_{j,9596}$	0.004 (1.17)	0.004 (1.15)	-0.002 (0.28)	-0.002 (0.28)
ERP$_{j,95}$$^{(a)}$	-0.347 (1.74)+	-0.329 (1.66)+	-0.228 (0.82)	-0.224 (0.80)
Mills ratio	-0.275 (2.72)**	-0.275 (2.72)**	-0.258 (3.13)**	-0.259 (3.15)**
Year dummy 1998	-0.148 (8.31)**	-0.148 (8.31)**	-0.012 (0.83)	-0.012 (0.82)
Year dummy 1999	-0.172 (8.05)**	-0.172 (8.05)**	-0.025 (1.34)	-0.024 (1.33)
Year dummy 2000	-0.080 (3.13)**	-0.080 (3.13)**	-0.027 (1.27)	-0.027 (1.26)
Dummy variables for provinces	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included
Constant	-0.011 (0.05)	-0.017 (0.08)	0.024 (0.12)	0.023 (0.11)
R-squared	0.04	0.04	0.02	0.02
F-statistics	11.91	11.9	4.5	4.46

Notes:

1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 10^3 to improve presentation.

The first specification gives a similar picture to that illustrated by Table 8.3. The average expansion (contraction) in performance over the period 1998-2000 was higher (lower) for foreign plants relative to domestic-private plants, as the coefficients of $DFOR_{9596}$ are positive in all equations. The mixed finding concerning government ownership can also be observed. For government plants, the average contraction in output is suggested to have been lower than the average contraction in employment. Nevertheless, the finding remains that suggests government plants contracted more in terms of profitability.

For the second specification, the positive coefficients of the $DFOR_{9596} * FOR_{9596}$ and the negative coefficients of FOR_{9596} across all equations provide support for *Hypothesis 3C*. All of these coefficients, apart from those of the equation for profitability, are statistically significant. This finding supports the argument that parent companies might restrict their affiliates access to knowledge, either in technology or global market network.

The parameter estimates of the second specification are used to estimate the minimum foreign share required to have at least zero percentage difference in performance (i.e. $\%\Delta y_{i,t} = 0$). The computational results are given in Table 8.5. The table shows the estimates are quite large, i.e., about 50 per cent or greater. Based on these estimates, it can be concluded that foreign plants did not necessarily perform better than other plants. Only those with a very high share of foreign ownership are indicated to have performed well compared with other plants.

Table 8.5 The estimates of foreign share for which $\%\Delta y_{i,t} = 0$ is equal to zero

Performance measures			
Real value added	Real output	Employment	Real value added per labor
41	40	25	46

Note: The estimates were computed based only on the significant coefficients of FOR_{9596} and $DFOR_{9596}*FOR_{9596}$

Source: Regression results in Table 8.4.

Table 8.6 reports the probit regression results relating to the determinants of survival during the period 1997-2000. They correspond to the OLS regression results presented in Tables 8.3 and 8.4. The probit regressions are the first step in the Heckman selection model.

The equations pass the overall significance test (Wald Chi^2) at the 1 percent level and the specification test (Pregibon's link-test). At the experimental stage, $SIZE_{9596}$ and AGE_{9596} were specified in their linear form. However, this specification is not used at the end because introducing the variables in their natural logarithm form produces a significantly better model fit (Pseudo R^2). Using the non-linear specifications, the pseudo R^2 increase in the range of 7 to 14 percentage points across the equations presented in Table 8.6.

Table 8.6 The determinants of survival: regression results

Dependent variable	$S_{i,t}$					
Specification	8.31	8.32	8.33	8.34	8.35	8.36
$\log(SIZE_{i,9596})$	0.405 (35.81)**	0.403 (35.66)**	0.406 (34.96)**	0.406 (34.97)**	0.406 (34.81)**	0.406 (34.83)**
$\log(AGE_{i,9596})$	0.203 (24.95)**	0.204 (25.03)**	0.199 (24.21)**	0.199 (24.21)**	0.199 (24.17)**	0.199 (24.21)**
$FOR_{i,9596}$	0.087 (1.92)+	0.091 (2.37)*	0.079 (2.16)*	0.080 (2.16)*		
$GOV_{i,9596}$	-0.025 (0.34)	-0.023 (0.32)	-0.047 (0.64)	-0.046 (0.64)		
$DFOR_{i,9596}$					0.044 (1.65)+	-0.097 (1.26)
$DFOR_{i,9596}$*$FOR_{i,9596}$						0.204 (1.88)+
$DGOV_{i,9596}$					-0.005 (0.08)	-0.005 (0.09)
$EXP_{i,9596}$	0.028 (1.58)	0.017 (1.59)	0.017 (1.57)	0.028 (1.57)	0.023 (1.56)	0.030 (1.59)
$LEV_{i,9596}$	0.009 (0.69)	0.009 (0.43)	0.009 (0.10)	0.009 (0.13)	0.009 (0.03)	0.009 (0.20)
$IMDEP_{i,9596}$	0.034 (0.85)	0.035 (0.89)	0.036 (0.89)	0.036 (0.90)	0.040 (1.00)	0.040 (1.00)
$PCI2_{i,9596}$[(a)]	-0.139 (0.57)	-0.142 (0.58)	-0.048 (0.18)	-0.049 (0.18)	-0.048 (0.18)	-0.041 (0.15)
$PSI2_{i,9596}$	-0.051 (3.94)**	-0.050 (3.87)**	-0.052 (4.15)**	-0.052 (4.17)**	-0.053 (4.21)**	-0.053 (4.19)**
$DLI_{j,9596}$		0.265 (3.05)**	0.435 (2.40)*			
$DCI_{j,9596}$		-0.111 (0.56)	0.183 (0.79)			
$CR4_{j,9596}$			-2.687 (7.01)**	-2.704 (7.15)**	-2.699 (7.13)**	-2.698 (7.13)**
$IMP_{j,9596}$			-0.004 (0.49)	-0.003 (0.46)	-0.003 (0.47)	-0.003 (0.47)
$ERP_{j,95}$[(a)]			-0.001 (2.73)**	-0.001 (2.56)*	-0.001 (2.56)*	-0.001 (2.55)*
Year dummy 1998	-0.333 (13.77)**	-0.333 (13.77)**	-0.336 (13.74)**	-0.336 (13.74)**	-0.336 (13.74)**	-0.336 (13.74)**
Year dummy 1999	-0.454 (19.02)**	-0.454 (19.02)**	-0.457 (18.92)**	-0.457 (18.92)**	-0.457 (18.92)**	-0.457 (18.92)**
Year dummy 2000	-0.581 (24.56)**	-0.581 (24.56)**	-0.581 (24.29)**	-0.581 (24.29)**	-0.581 (24.29)**	-0.581 (24.29)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	-1.727 (10.72)**	-1.711 (10.61)**	-0.062 (0.22)	-0.054 (0.19)	-0.056 (0.20)	-0.061 (0.21)
Pseudo R2	0.14	0.14	0.14	0.14	0.14	0.14
Wald Chi2	3737.7	3774.3	3657.0	3648.5	3637.8	3642.5
Specification test Pregibon LINK test	Pass	Pass	Pass	Pass	Pass	Pass

Notes:

1) Robust Z statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 10^3 to improve presentation.

The table shows that size and age are important in increasing plant survival probability during the 1997-2000 period. The coefficients of $\log(SIZE_{9596})$ and $\log(AGE_{9596})$ are positive, large and statistically very significant. This finding is in line with findings in the literature on the determinants of firm survival. As is often argued in this literature, the finding supports the argument that larger firms are less financially constrained and closer to the industry's optimal efficient size.

In the context of this period where many firms were experiencing financial difficulties, the finding suggests banks were willing to bear the risk in allowing large firms to keep operating. This suggestion is based on the argument that the extent of credit rationing is significantly lower in large firms (Petersen and Rajan 1994). As explained, this is likely because banks have better information on the investment opportunities of large firms relative to those of small ones.

The finding on age provides supporting evidence for the importance of experience. As with the finding on size, it is also in line with the findings in most general studies that examine the determinants of firm survival. In particular, it supports the theory of passive learning (Jovanovic 1982) which posits that firms over time learn their costs and decide whether to expand, contract or exit. The firms which do survive are older firms that have accumulated experience and assets, making them stronger and lowering the probability of failure in the event of economic shocks. The finding also supports the hypothesis that credit rationing is less severe for older firms (Diamond 1991).

The probability of survival was higher for foreign and export-oriented firms. The coefficients of variables that represent foreign ownership (FOR_{9596} and $DFOR_{9596}$) are positive and statistically significant. This finding is consistent with the previous results on performance difference equations (i.e. Table 8.3 and 8.4). A consistently positive effect is also found for the interaction variable of $FOR_{9596} * DFOR_{9596}$, albeit only statistically significant at the 10 per cent level. This finding supports the comment made earlier that the success of foreign firms in responding to the crisis depended on the degree of the foreign share.

Unlike the finding on foreign ownership, the positive coefficients of EXP_{9596} are only statistically significant at the 12 per cent level. Thus, export oriented plants were not more likely to survive than domestic-oriented ones. Perhaps the finding reflects the effect of many factors contributing to the sluggish export performance during the crisis. As reviewed in Chapter 4, these factors include the seasonal weak demand in 1995 and 1996, depreciation of Japanese yen against US dollars, contraction of credit supply during the period and some structural- and political-related factors (political turmoil which resulted in cancellation of export orders, rejection of letters of credit from Indonesian banks and a lack of supply of containers).

Factor intensity is another important factor that determines survival. The results indicate that firm survival during the period was lower for firms that employed many skilled workers, as $PSI2_{9596}$ is negative and statistically significant. This finding supports earlier comment and other studies (Dwor-Frecaut et al. 2000; Manning, 2000) which indicate labour hoarding.

The coefficient of DLI_{9596} is positive and statistically significant, indicating that plants in labour-intensive industries survived better than firms in resource-intensive industries. This finding is in line with our earlier finding on the performance difference equation, which points to a positive impact on competitiveness from the sharp exchange rate depreciation. The higher survival chance perhaps reflects the success of these firms in mitigating the extent of financial distress with large sales revenue from exports. As described in Chapter 2, many plants in labour intensive industries are also export-oriented.

Finally, the coefficients of $CR4_{9596}$ and ERP_{95} are negative and statistically significant, indicating the survival chance was lower for firms in concentrated and protected industries. While the finding on $CR4_{9596}$ is in line with the earlier finding from the performance difference equation, the finding on ERP_{95} now provides even more convincing evidence on the importance of industry protection in determining the success of the plants in responding the crisis. Earlier in Table 8.3 ERP_{95} was only weakly, negatively related to differences in performance. Accordingly, the finding provides more evidence for the X-inefficiency hypothesis. A conclusion thus can be drawn that more exposure to import competition prior to the crisis contributed positively to the success of firms in responding to the crisis.

8.3.1 Do the effect of the characteristics change over time?

This section examines whether the effect of the characteristics observed earlier changed during the 1997-2000 period. It is natural to expect some of the effects might have changed as the economy began to recover in 1999. Indeed, the descriptive analysis has shown that some of the observed patterns changed over this period.

Table 8.7 compares of the regression results for every year within the period 1998-2000. The results for 1997 are not presented as the crisis only began in the last quarter of that year. The results were derived by regressing equation 8.2 separately instead of using the dummy-variables approach (i.e. by having many interaction variables between the time dummy variables and explanatory variables). The separate-regression approach was employed because it was revealed at the experimental stage that the variances of the separate regressions are statistically different, and in such a situation regressing the equation by the dummy-variable approach would result in inefficient estimates (Gujarati 1995). Except for the difference in employment, the Chow tests presented in Appendix 8.3 conclude that the regression lines across the years are statistically different, providing another justification for examining the equation separately.

Table 8.7 The determinants of performance impact of the crisis: separate regression results

Dependent variable	$\%\Delta RVA_{i,t}$			$\%\Delta ROUT_{i,t}$		
Year	1998	1999	2000	1998	1999	2000
Specification	8.37	8.38	8.39	8.40	8.41	8.42
$\log(SIZE_{i,9596})$	-0.030 (0.98)	0.050 (1.76)+	0.049 (1.51)	0.027 (1.17)	0.051 (2.11)*	0.083 (3.09)**
$\log(AGE_{i,9596})$	-0.092 (3.76)**	-0.052 (2.39)*	-0.049 (2.03)*	-0.045 (2.37)*	-0.032 (1.74)+	-0.028 (1.37)
$FOR_{i,9596}$	0.245 (2.62)**	0.304 (3.63)**	0.420 (5.01)**	0.192 (2.84)**	0.241 (3.60)**	0.356 (5.52)**
$GOV_{i,9596}$	0.095 (1.23)	-0.010 (0.12)	0.018 (0.20)	0.092 (1.67)+	0.108 (1.79)+	0.126 (2.01)*
$EXP_{i,9596}$	0.314 (4.90)**	0.226 (3.40)**	0.142 (2.01)*	0.328 (6.39)**	0.183 (3.25)**	0.112 (1.89)+
$LEV_{i,9596}$	-0.000 (0.09)	0.004 (1.00)	0.004 (0.80)	-0.005 (0.82)	-0.002 (0.37)	-0.002 (0.34)
$IMDEP_{i,9596}$	0.016 (0.26)	0.062 (1.03)	0.137 (2.20)*	0.016 (0.34)	0.014 (0.29)	0.084 (1.64)
$PCI2_{i,9596}$ (a)	-0.574 (1.39)	-0.683 (1.54)	-0.637 (1.53)	-0.579 (2.28)*	-0.739 (2.63)**	-0.729 (2.58)**
$PSI2_{i,9596}$	-0.029 (1.57)	-0.037 (1.82)+	-0.058 (2.97)**	-0.026 (1.66)+	-0.045 (2.32)*	-0.044 (2.66)**
$CR4_{j,9596}$	0.047 (0.08)	-0.425 (0.64)	-0.316 (0.47)	0.040 (0.08)	-0.461 (0.84)	-0.213 (0.34)
$IMP_{j,9596}$	0.015 (1.84)+	0.011 (1.29)	0.010 (1.11)	0.016 (2.41)*	0.011 (1.51)	0.005 (0.59)
$ERP_{j,95}$ (a)	-0.119 (0.26)	-0.551 (1.25)	-0.258 (0.56)	-0.082 (0.28)	-0.381 (0.97)	-0.380 (0.87)
Mills ratio	-0.091 (0.41)	0.310 (1.64)	0.431 (2.10)*	0.305 (1.70)+	0.491 (2.98)**	0.622 (3.49)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	0.234 (0.52)	-0.316 (0.64)	-0.647 (1.35)	-0.088 (0.26)	-0.635 (1.65)+	-1.315 (3.05)**
R-squared F-statistics	0.06 4.26	0.08 5.71	0.07 5.07	0.09 7.38	0.09 6.65	0.08 5.69

Table 8.7 continued

Dependent variable	$\%\Delta EMPL_{i,t}$			$\%\Delta RVL_{i,t}$		
Year	1998	1999	2000	1998	1999	2000
Specification	8.43	8.44	8.45	8.46	8.47	8.48
$\log(SIZE_{i,9596})$	-0.036 (2.69)**	-0.046 (2.97)**	-0.043 (2.62)**	0.003 (0.08)	0.093 (3.16)**	0.088 (2.61)**
$\log(AGE_{i,9596})$	-0.030 (2.92)**	-0.049 (4.61)**	-0.061 (5.56)**	-0.064 (2.55)*	-0.006 (0.27)	0.010 (0.39)
$FOR_{i,9596}$	0.104 (3.35)**	0.072 (2.23)*	0.096 (2.78)**	0.142 (1.54)	0.233 (2.94)**	0.324 (4.06)**
$GOV_{i,9596}$	0.095 (2.26)*	0.068 (1.54)	0.059 (1.28)	-0.024 (0.30)	-0.104 (1.10)	-0.067 (0.68)
$EXP_{i,9596}$	0.089 (3.56)**	0.122 (4.41)**	0.110 (3.71)**	0.219 (3.44)**	0.098 (1.53)	0.025 (0.37)
$LEV_{i,9596}$	-0.001 (0.65)	-0.002 (1.06)	-0.002 (0.96)	0.001 (0.14)	0.006 (1.92)+	0.006 (1.61)
$IMDEP_{i,9596}$	0.049 (2.22)*	0.033 (1.38)	0.064 (2.48)*	-0.028 (0.48)	0.033 (0.59)	0.079 (1.34)
$PCI2_{i,9596}$[(a)]	0.800 (4.24)**	0.719 (3.66)**	0.782 (3.95)**	-1.354 (3.03)**	-1.380 (2.82)**	-1.394 (3.01)**
$PSI2_{i,9596}$	-0.046 (3.58)**	-0.036 (2.42)*	-0.031 (2.34)*	0.008 (0.32)	-0.010 (0.35)	-0.036 (1.39)
$CR4_{j,9596}$	-0.527 (2.52)*	-0.475 (2.11)*	-0.223 (0.81)	0.626 (1.10)	0.097 (0.15)	-0.032 (0.05)
$IMP_{j,9596}$	0.004 (1.49)	0.006 (1.75)+	0.008 (1.93)+	0.011 (1.32)	0.005 (0.62)	0.002 (0.17)
$ERP_{j,95}$[(a)]	-0.061 (0.45)	0.151 (0.98)	0.135 (0.77)	-0.099 (0.23)	-0.756 (1.91)+	-0.443 (1.05)
Mills ratio	0.195 (1.89)+	0.137 (1.34)	0.148 (1.40)	-0.299 (1.28)	0.171 (0.88)	0.272 (1.29)
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Dummy variables for industries	Included	Included	Included	Included	Included	Included
Constant	0.434 (2.82)**	0.620 (3.60)**	0.391 (1.92)+	-0.191 (0.41)	-0.934 (1.86)+	-1.033 (2.15)*
R-squared	0.09	0.08	0.08	0.05	0.08	0.07
F-statistics	5.72	4.98	4.89	3.34	5.84	5.00

Table 8.7 continued

Table 8.7 concluded

Dependent variable	$\%\Delta PCM_{i,t}$		
Year	1998	1999	2000
Specification	8.49	8.50	8.51
$\log(SIZE_{i,9596})$	0.012 (0.79)	-0.011 (0.42)	0.048 (2.26)*
$\log(AGE_{i,9596})$	-0.048 (2.74)**	-0.010 (0.43)	0.015 (0.75)
$FOR_{i,9596}$	0.098 (1.68)+	0.126 (1.89)+	0.149 (2.35)*
$GOV_{i,9596}$	0.030 (0.41)	-0.226 (1.82)+	-0.193 (1.85)+
$EXP_{i,9596}$	0.023 (0.46)	0.093 (1.54)	0.060 (1.03)
$LEV_{i,9596}$	0.000 (0.14)	-0.000 (0.04)	-0.001 (0.69)
$IMDEP_{i,9596}$	-0.091 (2.00)*	-0.024 (0.45)	0.011 (0.22)
$PCI2_{i,9596}{}^{(a)}$	-0.460 (2.14)*	-0.215 (0.94)	-0.141 (0.62)
$PSI2_{i,9596}$	-0.033 (1.15)	-0.030 (1.47)	-0.046 (2.98)**
$CR4_{j,9596}$	0.522 (1.06)	0.270 (0.41)	0.660 (1.02)
$IMP_{j,9596}$	0.001 (0.10)	-0.001 (0.05)	-0.000 (0.03)
$ERP_{j,95}{}^{(a)}$	-0.158 (0.27)	-0.327 (0.65)	-0.107 (0.17)
Mills ratio	-0.430 (2.80)**	-0.254 (1.30)	0.033 (0.19)
Dummy variables for provinces	Included	Included	Included
Dummy variables for industries	Included	Included	Included
Constant	-0.242 (0.56)	0.191 (0.41)	-0.164 (0.39)
R-squared	0.02	0.03	0.02
F-statistics	1.95	2.46	1.79

Notes:

1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10'

a) The coefficient was multiplied by 10^3 to improve presentation.

Comparison of the results reveals several interesting findings. First, there is some evidence of a positive and substantial effect for firm size in the early recovery period. The coefficients of $\log(SIZE_{9596})$ in the equations for output, labour productivity and profitability are positive, larger and statistically significant in the results for 1999 and 2000 compared with those for 1998.

This finding somewhat contradicts the findings from some previous studies (e.g. Forbes 2000b; Berry et al. 2001) that smaller firms performed better than larger ones during the crisis. For example, using firm-level data from the Indonesian Ministry of Cooperative and SMEs (Small- and Medium-scale Enterprise) (MOCSME), Berry et al. found that small firms expanded their value added by about 35 per cent in 1998 against a contraction by about 5 and 27 per cent experienced by large firms.[3] Nevertheless, the finding is in line with previous studies which examined the relationship using other performance measures and a different data source. Using The World Bank firm level survey, Dwor-Frecaut et al. (2000) found the firms that expanded exports in Thailand and Malaysia during the period 1998-99 were mostly large (about 60 per cent of firms in the sample). Meanwhile, Claessens et al. (2000) found that the 1998 sales margin of some publicly listed companies in some crisis affected countries (Indonesia, Malaysia, Korea and Thailand) and two other Asian countries (Singapore and Hong Kong) is positively related to firm size, proxied by the log of the firms' sales in 1996.

Despite the finding, there is no clear explanation for the results. Several possible explanations are suggested from the discussion in Chapter 4, including economies of scale, market power and more access to financing. To be able to answer this question more definitively, a methodology that goes deeper into detailing the strategic behaviour of large firms should be applied, which is a task beyond this thesis.

The second key finding is that the positive effect of foreign ownership became more important in the recovery period. The coefficients of FOR_{9596} increase and become more statistically significant over the period across all equations except those for employment. This finding is predicted in the context of higher competitive struggle. With the low demand

[3] However, it is important to bear in mind that the data used in this study (i.e. SI data) are different to those of MOCSME in three respects: first, SI data do not include plants with more than 20 employees, second, MOCSME data define size in terms of size – rather than in terms of employment – and finally, MOCSME data include all types of commercial activities, not only manufacturing.

situation and lower trade protection in this period, it is likely to expect foreign firms would be the winner in responding to the crisis.[4] This is most likely because of their internal financial support (from parent companies) and higher opportunities for export expansion.

The results on government ownership provide more support for the inference that the government tended to bail out its companies for social reasons. The positive coefficient of GOV_{9596} in the equation for employment is only statistically significant in the regression for 1998, the peak of the crisis. As this year was marked by social and political turmoil, this finding indicates job loss was minimised in the SOEs.

The fourth key finding is that the effect of sales orientation was less important in the early recovery. The coefficients of EXP_{9596} and their statistical significances decrease over the years in almost all equations. This finding suggests the export response to the crisis was significantly lower over this period. Some reasons put forward in the literature, which were mentioned earlier, are likely to have been the main factors contributing to this finding.

The declining pattern in the effect of sales orientation provides more evidence for the earlier speculation that the negative effect of firm age on performance might have been caused by the fact that many younger firms are exporters. The results show that the negative effect of firm age is largest and most importantly occurred at the peak of the crisis, which is when the effect of sales orientation was the largest. The evidence is also clear in the equations for output and labour productivity.

Table 8.8 presents the corresponding results of the probit regression for the determinants of survival separately for every year during the period 1998-2000.

Comparing the results across years, the general picture does not really change from the one presented in the previous table. There is no change in terms of which variables determine survival or the direction of the effect. Nevertheless, a few additional findings are evident. First, the results on FOR_{9596} suggest the positive effect of foreign ownership was highest and most importantly occurred during the peak of the crisis. Although this is not in line with the finding from the difference equations, this finding provides more evidence to support the

4 See Chapter 3 which describes the acceleration in the trade and investment reforms originating from the IMF structural reform programs.

hypothesis that foreign firms tend to support struggling affiliates. It reflects, for example, the observation made by Fukao (2001) that Japanese parent companies financially assisted their crisis-affected affiliates and helped them switch from local to export sales.

Table 8.8 The determinants of survival: separate regression results

Dependent variable	$S_{i,t}$		
Specification	8.52	8.53	8.54
Year	1998	1999	2000
$\log(SIZE_{i,9596})$	0.416 (17.69)**	0.443 (19.37)**	0.422 (19.62)**
$\log(AGE_{i,9596})$	0.235 (14.19)**	0.213 (13.33)**	0.203 (13.11)**
$FOR_{i,9596}$	0.093 (1.87)+	0.076 (1.69)+	0.026 (0.46)
$GOV_{i,9596}$	0.084 (0.52)	-0.169 (1.22)	-0.045 (0.34)
$EXP_{i,9596}$	0.024 (0.77)	0.015 (1.08)	0.008 (0.86)
$LEV_{i,9596}$	0.010 (0.12)	0.009 (0.19)	0.009 (0.11)
$IMDEP_{i,9596}$	0.038 (0.48)	0.060 (0.76)	0.034 (0.44)
$PCI2_{i,9596}{}^{(a)}$	0.089 (0.15)	-0.163 (0.36)	0.074 (0.14)
$PSI2_{i,9596}$	-0.059 (2.30)*	-0.048 (1.94)+	-0.047 (1.98)*
$CR4_{j,9596}$	-2.876 (3.82)**	-2.938 (3.81)**	-3.039 (4.05)**
$IMP_{j,9596}$	-0.020 (1.21)	-0.002 (0.11)	0.014 (1.05)
$ERP_{j,95}{}^{(a)}$	-1.139 (1.96)+	-0.089 (1.53)	-0.482 (0.88)
Dummy variables for provinces	Included	Included	Included
Dummy variables for industries	Included	Included	Included
Constant	-0.303 (0.54)	-0.458 (0.81)	-0.335 (0.60)
Pseudo R2 Wald Chi2	0.14 923.21	0.14 987.94	0.14 1033.11

Notes:

1) Robust Z statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 1(

a) The coefficient was multiplied by 10^3 to improve presentation.

The positive effect of sales orientation for survival was lower in the early recovery, suggested by the declining coefficients of EXP_{9596} over the years. This finding supports the earlier suggestion that export response to the crisis tended to be weaker during the early recovery.

Finally, the results show that the negative effect of trade protection on survival was lower in the early recovery as the statistical significance of ERP_{95} declines over the years. There is no clear explanation for this. It might just reflect the removal of most of the trade protection that still persisted at the beginning of the crisis.

8.4 Some interaction effects

8.4.1 Hypotheses

The previous section found that the impact of some firm characteristics are either ambiguous or do not accord with the predictions posted earlier in the chapter. As noted, this might be the result of the interaction effects of some characteristics. The analysis now progresses to test some of these interrelationships. Based on the discussion in Chapter 4, the following interaction effects and their hypotheses are considered.

Sales orientation and foreign ownership

The impact of sales orientation is likely to depend on foreign ownership. At a given level of export propensity, the contraction in performance is expected to have been lower in firms with a high foreign share (*Hypothesis* 9). This positive relationship might have occurred because foreign exporting firms were more able to realise the higher incentive to export due to an established marketing network in international markets and a lower likelihood of financial constraint. As indicated by other studies (e.g. Desai et al. 2004; Blalock and Gertler 2005), the lower likelihood of financial constraint helped these firms keep on a high growth of investment in response to the improved competitiveness from the sharp exchange rate depreciation.

Sales orientation and financial leverage

The positive effect of export orientation might have also depended on the debt burden carried by exporting firms. This interrelationship is expected to be negative (*Hypothesis* 10). The boost to competitiveness from the sharp exchange rate depreciation might be mitigated if a firm has large debt denominated in foreign currency. The exchange rate depreciation inflates the domestic value of the debt and therefore might lower the firms' ability to increase investment.

Sales orientation and size

The success of export oriented firms in responding to the crisis might have been more significant in large firms (*Hypothesis* 11). The hypothesis is based on the literature on firm exporting which posits a positive relationship between size and exporting behaviour (e.g. Bonacorsi 1992; Calof 1994). The rationale is that large firms are better able to compete in competitive international markets because they have lower costs from economies of scale, are able to hire managers skilled in selling their product in international markets and are often less financially constrained.

Financial leverage and size

The impact of financial leverage might also depend on size. This relationship, however, is difficult to predict a priori (*Hypothesis 12*). On the one hand, large firms are likely to have been severely affected by the collapse of the domestic financial system. Several studies, e.g. Claessens et al. (2000), have shown that large firms in East Asian countries heavily depend on financial markets – particularly from banks – to finance investments. On the other hand, theory and some previous empirical studies suggest the potential for credit rationing is expected to be lower for large firms, as banks are usually not able to obtain as much pertinent information in the case of small firms.

Financial leverage and foreign ownership

The impact of firm financial leverage is expected to be lower in firms with high foreign ownership (*Hypothesis 13*). This hypothesis is derived from the argument that foreign firms have access to international capital markets, mostly through parent companies which provide support when financial difficulties are experienced.

Import dependence and sales orientation

The expected negative impact of import dependence might have been lower in export oriented firms (*Hypothesis 14*). Higher imported-inputs cost as a result of the sharp exchange rate depreciation could have been matched by higher expected revenue from export sales.

8.4.2 Econometric results

To test the above hypotheses, interaction variables representing them were added one by one to equation 8.2 and the equations were then regressed separately for every year for the period 1998-2000. To save space, the regression results presented in Table 8.9 are only a summary and the complete results are given in Appendix 8.4. In the table, the coefficients that correspond to the interaction variables are also displayed. It is important to note that all results which have LEV_{9596} in the interaction variables may give unclear results because of the limitation of the variable.

Sales orientation and foreign ownership

The results provide strong support for *Hypothesis 9* and show that the effect of sales orientation was higher for plants with a high foreign ownership share. The coefficients of $EXP_{9596} * FOR_{9596}$ are positive across all equations and are mostly statistically significant. The magnitude of the coefficients also suggests the interrelationship is economically important.

The finding highlights the superiority of foreign exporters over domestic in respect to access to international markets. Blalock and Gertler (2005) argued that one form of this superiority is the ability of parent companies to assist with access to credit which ensures the affiliates against a liquidity problem. They support this argument by demonstrating that only foreign exporters in Indonesian manufacturing increased investment during and shortly after the crisis.[5]

[5] A similar finding was also found by Krueger and Tornell (1999) in the case of Mexican foreign exporters during the currency crisis in the 1990s.

Table 8.9 Summary of the regression results for the test of interaction effects: performance difference equations

Dependent variable	$\%\Delta RVA_{i,t}$			$\%\Delta ROUT_{i,t}$		
Year	1998	1999	2000	1998	1999	2000
Specification	8.55	8.56	8.57	8.58	8.59	8.60
Sales orientation*Foreign ownership						
$FOR_{i,9596}$	-0.093 (0.77)	0.075 (0.70)	0.158 (1.46)	0.029 (0.31)	0.079 (0.90)	0.153 (1.78)+
$EXP_{i,9596}$	0.175 (2.58)**	0.127 (1.79)+	0.028 (0.37)	0.264 (4.90)**	0.114 (1.90)+	0.025 (0.38)
$EXP_{i,9596}*FOR_{i,9596}$	0.936 (4.41)**	0.637 (3.14)**	0.722 (3.54)**	0.445 (2.78)**	0.449 (2.74)**	0.561 (3.53)**
Sales orientation*leverage						
$LEV_{i,9596}$	-0.001 (0.21)	0.005 (1.00)	0.003 (0.63)	-0.005 (0.67)	-0.001 (0.23)	-0.002 (0.23)
$EXP_{i,9596}$	0.315 (4.91)**	0.228 (3.42)**	0.141 (2.00)*	0.333 (6.50)**	0.187 (3.33)**	0.115 (1.94)+
$EXP_{i,9596}*LEV_{i,9596}$	0.002 (0.29)	-0.001 (0.13)	0.002 (0.26)	-0.004 (0.37)	-0.003 (0.54)	-0.002 (0.39)
Sales orientation*Size						
$\log(SIZE_{i,9596})$	-0.049 (1.36)	0.042 (1.32)	0.049 (1.35)	0.012 (0.43)	0.041 (1.45)	0.080 (2.56)*
$EXP_{i,9596}$	-0.018 (0.06)	0.094 (0.33)	0.142 (0.46)	0.086 (0.36)	0.036 (0.15)	0.059 (0.23)
$EXP_{i,9596}*\log(SIZE_{i,9596})$	0.064 (1.18)	0.025 (0.49)	-0.000 (0.00)	0.047 (1.07)	0.028 (0.64)	0.010 (0.21)
Leverage*Size						
$\log(SIZE_{i,9596})$	-0.031 (1.03)	0.047 (1.66)+	0.044 (1.37)	0.025 (1.08)	0.048 (2.00)*	0.080 (2.95)**
$LEV_{i,9596}$	-0.021 (1.13)	-0.005 (0.34)	-0.012 (0.62)	-0.017 (0.71)	-0.012 (0.58)	-0.018 (0.75)
$LEV_{i,9596}*\log(SIZE_{i,9596})$	0.004 (1.34)	0.002 (0.79)	0.003 (0.95)	0.002 (0.60)	0.002 (0.60)	0.003 (0.82)
Leverage*Foreign ownership						
$FOR_{i,9596}$	0.243 (2.61)**	0.297 (3.55)**	0.413 (4.92)**	0.188 (2.81)**	0.235 (3.51)**	0.350 (5.42)**
$LEV_{i,9596}$	-0.001 (0.12)	-0.002(a) (0.00)	-0.001 (0.09)	-0.006 (0.88)	-0.006 (0.82)	-0.006 (0.72)
$LEV_{i,9596}*FOR_{i,9596}$	0.399(a) (0.01)	0.028 (1.78)+	0.028 (2.00)*	0.004 (0.12)	0.023 (1.08)	0.024 (1.30)
Import dependence*Sales orientation						
$EXP_{i,9596}$	0.241 (3.56)**	0.177 (2.45)*	0.085 (1.09)	0.281 (5.11)**	0.134 (2.19)*	0.057 (0.88)
$IMDEP_{i,9596}$	-0.060 (0.92)	0.014 (0.22)	0.083 (1.22)	-0.034 (0.64)	-0.034 (0.61)	0.030 (0.53)
$IMDEP_{i,9596}*EXP_{i,9596}$	0.440 (2.14)*	0.285 (1.48)	0.314 (1.64)	0.289 (1.82)+	0.289 (1.86)+	0.308 (1.95)+

Table 8.9 continued

Dependent variable	%ΔEMPL$_{i,t}$			%ΔRVL$_{i,t}$		
Year	1998	1999	2000	1998	1999	2000
Specification	8.61	8.62	8.63	8.64	8.65	8.66
Sales orientation*Foreign ownership						
FOR$_{i,9596}$	0.086 (2.15)*	0.052 (1.30)	0.043 (0.96)	-0.175 (1.46)	0.028 (0.27)	0.122 (1.15)
EXP$_{i,9596}$	0.082 (2.95)**	0.114 (3.68)**	0.087 (2.66)**	0.089 (1.32)	0.010 (0.14)	-0.063 (0.85)
EXP$_{i,9596}$*FOR$_{i,9596}$	0.049 (0.72)	0.057 (0.74)	0.146 (1.81)+	0.876 (4.25)**	0.570 (3.00)**	0.560 (2.88)**
Sales orientation*leverage						
LEV$_{i,9596}$	-0.002 (1.02)	-0.003 (1.24)	-0.003 (1.27)	0.001 (0.24)	0.008 (1.98)*	0.006 (1.56)
EXP$_{i,9596}$	0.088 (3.53)**	0.121 (4.34)**	0.108 (3.65)**	0.221 (3.47)**	0.101 (1.58)	0.026 (0.38)
EXP$_{i,9596}$*LEV$_{i,9596}$	0.003 (1.58)	0.004 (1.25)	0.005 (1.35)	-0.001 (0.12)	-0.005 (0.97)	-0.003 (0.67)
Sales orientation*Size						
log(SIZE$_{i,9596}$)	-0.035 (2.46)*	-0.049 (3.11)**	-0.040 (2.40)*	-0.017 (0.45)	0.089 (2.73)**	0.086 (2.31)*
EXP$_{i,9596}$	0.110 (1.06)	0.056 (0.52)	0.141 (1.14)	-0.124 (0.44)	0.045 (0.17)	0.004 (0.01)
EXP$_{i,9596}$*log(SIZE$_{i,9596}$)	-0.004 (0.20)	0.013 (0.60)	-0.006 (0.26)	0.067 (1.23)	0.010 (0.20)	0.004 (0.07)
Leverage*Size						
log(SIZE$_{i,9596}$)	-0.036 (2.67)**	-0.044 (2.88)**	-0.041 (2.50)*	0.001 (0.03)	0.089 (3.02)**	0.081 (2.41)*
LEV$_{i,9596}$	0.002 (0.48)	0.012 (1.68)+	0.011 (1.53)	-0.023 (1.45)	-0.017 (1.17)	-0.024 (1.23)
LEV$_{i,9596}$*log(SIZE$_{i,9596}$)	-0.001 (0.86)	-0.003 (2.00)*	-0.003 (1.87)+	0.005 (1.73)+	0.005 (1.67)+	0.006 (1.61)
Leverage*Foreign ownership						
FOR$_{i,9596}$	0.101 (3.28)**	0.069 (2.15)*	0.092 (2.67)**	0.142 (1.55)	0.229 (2.89)**	0.321 (4.02)**
LEV$_{i,9596}$	-0.003 (1.45)	-0.004 (1.64)	-0.004 (1.71)+	0.002 (0.88)	0.004 (1.14)	0.004 (0.81)
LEV$_{i,9596}$*FOR$_{i,9596}$	0.012 (2.52)*	0.013 (2.53)*	0.016 (3.15)**	-0.012 (0.46)	0.015 (1.17)	0.012 (1.09)
Import dependence*Sales orientation						
EXP$_{i,9596}$	0.056 (2.00)*	0.086 (2.70)**	0.079 (2.31)*	0.175 (2.59)**	0.083 (1.19)	-0.003 (0.04)
IMDEP$_{i,9596}$	0.016 (0.65)	-0.003 (0.10)	0.034 (1.20)	-0.074 (1.21)	0.019 (0.30)	0.052 (0.83)
IMDEP$_{i,9596}$*EXP$_{i,9596}$	0.188 (2.69)**	0.209 (2.83)**	0.170 (2.23)*	0.268 (1.33)	0.091 (0.50)	0.153 (0.84)

Table 8.9 continued

Table 8.9 concluded

Dependent variable	$\%\Delta PCM_{i,t}$		
Year	1998	1999	2000
Specification	8.67	8.68	8.69
Sales orientation*Foreign ownership			
$FOR_{i,9596}$	-0.010	0.015	0.037
	(0.15)	(0.18)	(0.47)
$EXP_{i,9596}$	-0.021	0.047	0.011
	(0.37)	(0.66)	(0.16)
$EXP_{i,9596}*FOR_{i,9596}$	0.295	0.303	0.304
	(2.10)*	(1.73)+	(1.95)+
Sales orientation*leverage			
$LEV_{i,9596}$	0.340[(a)]	0.140[(a)]	0.001
	(0.18)	(0.05)	(0.48)
$EXP_{i,9596}$	0.019	0.091	0.061
	(0.38)	(1.50)	(1.05)
$EXP_{i,9596}*LEV_{i,9596}$	0.007	0.002	-0.006
	(1.44)	(0.28)	(1.09)
Sales orientation*Size			
$\log(SIZE_{i,9596})$	0.003	-0.018	0.034
	(0.19)	(0.71)	(1.50)
$EXP_{i,9596}$	-0.235	-0.110	-0.269
	(1.15)	(0.49)	(1.23)
$EXP_{i,9596}*\log(SIZE_{i,9596})$	0.050	0.039	0.062
	(1.33)	(0.95)	(1.53)
Leverage*Size			
$\log(SIZE_{i,9596})$	0.010	-0.013	0.048
	(0.65)	(0.50)	(2.22)*
$LEV_{i,9596}$	-0.026	-0.020	-0.012
	(2.22)*	(2.08)*	(0.98)
$LEV_{i,9596}*\log(SIZE_{i,9596})$	0.006	0.005	0.003
	(2.54)*	(2.54)*	(1.16)
Leverage*Foreign ownership			
$FOR_{i,9596}$	0.099	0.124	0.146
	(1.70)+	(1.86)+	(2.31)*
$LEV_{i,9596}$	0.005	0.004	0.002
	(1.79)+	(1.54)	(0.85)
$LEV_{i,9596}*FOR_{i,9596}$	-0.002	0.009	0.008
	(0.26)	(1.57)	(1.61)
Import dependence*Sales orientation			
$EXP_{i,9596}$	0.036	0.085	0.054
	(0.61)	(1.13)	(0.80)
$IMDEP_{i,9596}$	-0.078	-0.031	0.007
	(1.67)+	(0.55)	(0.13)
$IMDEP_{i,9596}*EXP_{i,9596}$	-0.074	0.045	0.026
	(0.52)	(0.24)	(0.18)

Note: 1) See Appendix 8.4 for the complete results.
2) Robust t statistics in parentheses.
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) The coefficient was multiplied by 10^3 to improve presentation.

Sales orientation and financial leverage

There is only very weak evidence for an interrelationship between sales orientation and financial leverage. Although mostly negative, as hypothesised, almost all of $EXP_{9596} * LEV_{9596}$ coefficients are statistically insignificant. This finding does not support *Hypothesis 10* and suggests having a high debt does not necessarily mitigate the positive impact from exporting. The finding is surprising, particularly given the fact that many exporters in developing countries borrow abroad (Kawai et al. 2000; Krueger and Tornell 1999; Aguiar 2005). Moreover, it does not accord to the general finding from Latin America's experience in the context of currency crises which show a negative relationship (e.g. Aguiar 2005; Krueger and Tornell 1999). As highlighted by Krueger and Tornell, one possible explanation might be that export oriented firms are more likely to be able to provide collateral in the form of receivables denominated in dollars.

Sales orientation and size

There is only weak evidence supporting *Hypothesis 11*. Although most of the $EXP_{9596} * \log(SIZE_{9596})$ coefficients show the expected sign (i.e. positive), all are statistically insignificant. Therefore, not only large exporters were able to successfully respond to the crisis. While the finding tends to contradict the theoretical prediction, it is consistent with the behavioural characteristic of small and medium size exporters in Indonesian manufacturing. As shown in several studies (e.g. Thee 1994; Berry et al. 2001), many of these firms have been successful in exporting because they are often involved in the sub-contracting schemes of much larger firms that are committed to export and able to find niche export markets as well as facilitated by either traders or foreign buyers. Despite this suggestion, the finding might have been affected by strong collinearity between $SIZE_{9596}$ and EXP_{9596}. Indeed, EXP_{9596} becomes highly insignificant after the introduction of the interaction variable, which indicates a severe collinearity problem (Gujarati 1995). A cleaner test for this hypothesis is accommodated in the next chapter, where the issue of export supply response is specifically addressed.[6]

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[6] The other alternative would be excluding one of the corresponding variables, either EXP_{9596} or $\log(SIZE)_{9596}$. While appealing, this method tends to contradict theory, since each of these variables is believed to have its direct effect to the dependent variables. In fact, this is what has been shown in the two previous tables.

Leverage and size

The results provide some evidence to suggest the negative effect of financial leverage affected smaller plants more adversely than larger ones. The coefficients of $LEV_{9596} * \log(SIZE_{9596})$, although positive in all equations, are seldom statistically significant. Despite providing only weak support, the positive coefficient agrees with the hypothesis that credit rationing varies across firms with different size (Petersen and Rajan 1994), and hence provides more evidence for the suggestion made earlier that banks were more willing to bear risk in allowing large firms to keep operating during the crisis. This finding also supports the suggestion made by other studies using macro and banking financial data (Gosh and Gosh 1999; Ding et al. 1998).

Leverage and foreign ownership

The results show a positive relationship for the interaction variable $LEV_{9596} * FOR_{9596}$, although the coefficients are statistically significant only in about half of the equations. Therefore they provide some support for *Hypothesis 13* and suggest the negative effect of financial leverage was lower for foreign firms. This agrees with the argument that foreign firms have more access to international capital and is also in line with observations made by Fukao (2001) and Desai et al. (2004). Desai et al. in particular observed that the responses of US leveraged affiliates in the crisis affected countries was significantly less limited than those of locally leveraged firms.

The coefficients of the interaction variable also increase over the period in almost all of the equations. As highly leveraged firms are also likely to be highly bank-dependent firms, this finding provides even stronger evidence for the involvement of parent companies in supporting their financially constrained affiliates. The increasing trend perhaps also reflects the situation described by Pardede (1999) that banks, particularly the domestic ones, tended to be more selective in giving loans to companies. It is natural to expect banks prefer to lend to foreign rather than to domestic firms, because of the presumption that foreign firms are likely to be assisted financially by their parent companies, if they are in difficulty, and more likely to be exporters, which are able to offer banks a better cash flow projection from their foreign-currency denominated revenues.

It is worth mentioning here that the set of results in the last two hypothesis tests now show a consistently predicted sign (i.e. negative) of LEV_{9596}. Although mostly statistically insignificant, they at least provide some support for the theoretical explanation on the negative impact from the balance sheet effect. This finding is now in line with the general finding from other studies, particularly that of Claessens et al. (2000) in the context of the 1997/98 Asian crisis.

Import dependence and sales orientation

The results provide some support for *Hypothesis 14*. The negative effect of higher imported-input cost is indicated to have been lower for export oriented plants, as $IMDEP_{9596} * EXP_{9596}$ coefficients are mostly positive across the equations. This finding supports the positive significant impact of sales orientation observed earlier. It also confirms earlier findings on the other interaction effect involving sales orientation (i.e. sales orientation-foreign ownership and sales-orientation-financial leverage) which in principal reflects the argument that exporters are less likely to be financially constrained.

It is also important to mention that some coefficients of $IMDEP_{9596}$ now show the expected sign (i.e. negative), albeit all are statistically insignificant. Earlier in Table 8.3 it was found that the coefficients are positive. Therefore, it can be concluded that, while the share of imported input in total input negatively affected performance, the extent to which it affected performance could have depended on sales orientation.

Table 8.10 presents the corresponding probit regression results for the testing on the interaction variables. As with the previous table, it is only a summary. The complete results are given in Appendix 8.5

Table 8.10 Summary of the regression results for the test of interaction effects: survival equations

Dependent variable	$S_{i,t}$		
Year	1998	1999	2000
Specification	8.73	8.74	8.75
Sales orientation*Foreign ownership			
$FOR_{i,9596}$	0.166	0.120	-0.003
	(1.25)	(0.95)	(0.17)
$EXP_{i,9596}$	0.037	0.019	0.002
	(1.21)	(0.80)	(1.03)
$EXP_{i,9596}$*$FOR_{i,9596}$	-0.193	-0.115	0.079
	(1.08)	(0.86)	(1.25)
Sales orientation*leverage			
$LEV_{i,9596}$	-0.002	-0.002	-0.002
	(0.38)	(0.41)	(0.46)
$EXP_{i,9596}$	0.004	-0.023	-0.016
	(0.84)	(1.09)	(1.01)
$EXP_{i,9596}$*$LEV_{i,9596}$	-0.091	-0.098	-0.087
	(2.56)*	(2.72)**	(2.53)*
Sales orientation*Size			
log($SIZE_{i,9596}$)	0.438	0.459	0.433
	(16.42)**	(17.81)**	(18.14)**
$EXP_{i,9596}$	0.731	0.497	0.369
	(2.22)*	(1.53)	(1.21)
$EXP_{i,9596}$*log($SIZE_{i,9596}$)	-0.154	-0.110	-0.080
	(2.21)*	(1.60)	(1.26)
Leverage*Size			
log($SIZE_{i,9596}$)	0.417	0.444	0.423
	(17.72)**	(19.40)**	(19.64)**
$LEV_{i,9596}$	0.057	0.056	0.048
	(1.50)	(1.54)	(1.46)
$LEV_{i,9596}$*log($SIZE_{i,9596}$)	-0.009	-0.009	-0.007
	(1.58)	(1.61)	(1.44)
Leverage*Foreign ownership			
$FOR_{i,9596}$	0.094	0.076	0.025
	(0.87)	(0.72)	(0.26)
$LEV_{i,9596}$	0.005	0.005	0.005
	(0.65)	(0.74)	(0.87)
$LEV_{i,9596}$*$FOR_{i,9596}$	0.052	0.051	0.044
	(1.21)	(1.19)	(1.11)
Import dependence*Sales orientation			
$EXP_{i,9596}$	0.053	0.037	0.006
	(0.59)	(0.43)	(0.07)
$IMDEP_{i,9596}$	-0.251	-0.321	-0.087
	(1.10)	(1.45)	(0.41)
$IMDEP_{i,9596}$*$EXP_{i,9596}$	0.075	0.107	0.047
	(0.85)	(1.24)	(0.56)

Note: 1) See Appendix 8.5 for the coimplete results
2) Robust Z statistics in parentheses.
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Unlike the results from the difference equations, the probit regression results are less satisfactory. Many coefficients of the interaction variables are statistically insignificant and some of them, such as those of $LEV_{9596} * \log(SIZE_{9596})$ and $LEV_{9596} * FOR_{9596}$, have very small Z-statistics. These unsatisfactory results might be due to collinearity between the corresponding interactions variables. For example, the coefficients of FOR_{9596} and EXP_{9596} across the regressions now becomes less statistically significant compared to the earlier results (see Table 8.6 and 8.8).

Nevertheless, several points are worth mentioning. First, the importance of foreign ownership in moderating the positive effect of sales orientation on survival was only clear in the early recovery period. The coefficients of $EXP_{9596} * FOR_{9596}$ change their sign from negative to positive in the regressions of 2000. This finding is in line with that of Blalock and Gertler (2005) mentioned earlier and therefore supports their argument that affiliates were less financially constrained due to more access to an alternative credit source.

Second, the coefficients of $EXP_{9596} * LEV_{9596}$ show the expected signs. For the result of 1998, the negative coefficient implies the positive effect of sales orientation to survival was lower at highly leveraged plants. This finding supports *Hypothesis 10*, but is in contrast to the earlier finding from the difference equation (see Table 8.9). It might share a similar situation as in Latin America during the currency crisis of the 1990s. Many exporters in the region, although were able to increase sales, were not able to increase investment. Aguiar (2005), for example, showed that many of these exporters actually were financially constrained, because a large portion of the increase in sales was used to service their foreign-denominated debt, since many of them borrow abroad.

Finally, the negative coefficient of $EXP_{9596} * \log(SIZE_{9596})$ supports the earlier suggestion that small and medium size exporters might have also been successful in responding to the crisis. While it is consistent with the characteristics of small and medium exporters in Indonesian manufacturing, the negative coefficient might have been the result of the decline in export participation of many exporters, particularly during the peak of the crisis. Supporting this argument, the coefficients indeed are statistically significant only for the regression of 1998, implying that the importance of being a large exporter was only evident when the economy began to recover.

8.5 Summary

The purpose of Chapter 7 and 8 was to investigate which firm characteristics were important in shaping the performance response of plants in Indonesian manufacturing to the crisis. Some characteristics, namely size, age, ownership, sales orientation, financial leverage, import dependency, factor intensity and industry competition, were examined in their relationship to the crisis impact on performance and survival. The major findings are summarised below.

First, the results suggest foreign ownership and sales orientation significantly determined the performance response. Foreign firms are shown to have performed better than domestic-private and state-owned firms. However, the extent to which foreign firms performed better greatly depends on the level of foreign share in the firms. The results indicate the share required for better performance was quite large. The econometric results show that the positive effect of foreign ownership increased over the years during the 1998-2000 period, suggesting the role of parent companies in shaping performance was most important during the early recovery period. This observation is consistent with the view that domestic banks were more selective in providing external financing after the crisis and the more competitive environment after the crisis.

Export-oriented firms are indicated to have been able to benefit from the boost of competitiveness from the sharp exchange rate depreciation. The results indicate that many plants with high export propensity expanded their performance. However, the positive effect of sales orientation is suggested to have been weaker in the early recovery. While there are many explanations for this, the declining pattern is consistent with the exchange rate appreciation which took place in 1999 and 2000.

The positive effect of sales orientation is found to depend on other plant characteristics. The positive effect of sales orientation is found to have been higher for plants with a high foreign ownership share. The results show this interrelationship was higher and particularly important in the early recovery, suggesting that foreign plants were not financially constrained, which allowed them to take advantage of the lower real exchange rate after the crisis.

The results also found, although only weakly, evidence for the interrelationship between sales orientation and financial leverage. In particular, that having a high debt does not necessarily mitigate the positive impact from being export oriented. This finding is similar to that found in Latin America's experience during the currency crisis of the 1990s.

Second, the results show a positive effect for size in shaping the performance response, but only in the early recovery. This is another important finding in respect to the common view that small firms weathered the crisis better than larger ones.

Third, the results suggest the government was not able to protect its companies. Contraction in profitability and labour productivity was larger at plants with high government ownership share. This is consistent with the tight state budget situation during and after the crisis. Despite this, the results suggest that to some extent the government exercised its power to ensure these companies shed less labour. The contraction in employment is lower for plants with a high government ownership share.

Fourth, the results provide evidence on the importance of factor intensity in determining performance response. On average, during the period 1998-2000 plants in capital intensive industries contracted more relative to plants in resource intensive industries. In contrast, performance contraction in labour intensive industries on average during the period was higher than that in resource intensive industries. A similar conclusion can be derived based on factor intensity variables at the plant-level. In particular, the performance contraction was higher for more capital intensive plants employing higher skilled workers. The latter is consistent with the labour hoarding hypothesis and other studies which indicate labour hoarding behaviour.

Fifth, the econometric results show that plants in less concentrated industries performed better than plants in more concentrated industries during the peak of the crisis. This finding suggests non-competitive behaviour, particularly collusive behaviour, tended to break down during the period. The finding is also consistent with studies which found a negative relationship for concentration over the business cycle.

Sixth, the econometric results also show that plants in industries with high exposure to import competition performed better than plants in protected industries or facing less import competition. This finding suggests managerial slackness contributes to a poorer performance response.

Seventh, the results show financial leverage is negatively related to the contraction in the performance, but only when interrelated with some other characteristics. However, the coefficients of the variable representing the characteristic are mostly statistically insignificant, suggesting highly leveraged plants did not necessarily perform poorly during the crisis. The results indicate the negative effect of financial leverage tended to have been lower in large, foreign and export oriented plants, although in most cases the coefficients were not statistically significant.

Eighth, the econometric analysis found that plant survival during the period 1997-2000 was determined by size, age, foreign ownership, sales orientation, factor intensity and industry competition. Of these determinants, the results show that size, age, factor intensity and industry competition were the most important. Foreign ownership and sales orientation, although positively related to a higher chance of survival, were not particularly important since the statistical significance of the variables representing them is only moderate. In general these findings are consistent with those of the determinants of the performance response. Nevertheless, the results do not indicate that the effect of the determinants changed substantially across the years during the period.

As for the hypothesis testing on the interaction effects in the determinants of survival, the results are less satisfactory, since many of the variables representing the effects are statistically insignificant. Nevertheless, two key observations are worth mentioning: first, the importance of foreign ownership in moderating the positive effect of sales orientation is only clear in the early recovery period and, second, the positive effect of sales orientation was lower for highly leveraged plants.

Appendix 8.1 Classification of manufacturing sector according to factor intensity (ISIC)

ISIC	Description
	Agriculture Resource Intensive
311-2	Food
313	Beverages
314	Tobacco
323	Leather and leather products
33111-3	Sawmills and other wood mills
35521-3	Pulp, paper and paperboard
	Mineral Resource Intensive
3512	Fertilisers and pesticides
354	Petroleum and coal products
361	Porcelain
363-9	Cement and non-metallic minerals
372	Non ferrous metal products
	Unskilled Labour Intensive
321	Textiles
322	Wearing Apparel
324	Footwear
331	Wood and wood products
332	Furniture
3522	Drugs and medicine
356	Plastics products
362	Glass and glass products
3811	General hardware
3812	Furniture, fixtures of primary metal
3832	Electronics components, communication
3841	Ship building and repairing
3845	Transport equipment
390	Other manufacturing

Appendix 8.1 continued

Appendix 8.1 concluded

ISIC	Description
	Technology Intensive
351	The rest of industrial chemical, except 3512
3529	Chemical products
3813	Structural metal products
382	Non-electrical machinery
3831	Electrical industrial machinery
3839	Electrical apparatus
3849	Aircraft
3851	Scientific equipment
3852	Photographic and optical goods
	Human Capital Intensive
341	The rest of paper products
342	Printing and publishing
352	The rest of chemical products, excl. 3522
3551/3559	Rubber products
371	Iron and basic steel
3814-9	Fabricated metal products
38321-8	Radio, television and communication equip.
3833	Electrical appliances and housewares
3842-4	Railroad equipment, vehicles
3853	Watched and clocks
3901	Jewellery and related articles

Source: Ariff and Hill (1985)

Appendix 8.2 The determinants of performance impact of the crisis: some regression results from econometric experiments

	Dependent variable						
	%ΔRVA						
Specification	(A7.1)	(A7.2)	(A7.3)	(A7.4)	(A7.5)	(A7.6)	(A7.7)
log($SIZE_{9596}$)	-0.017 (1.34)	-0.017 (1.49)	-0.017 (1.30)	-0.020 (1.49)	-0.024 (1.91)+	-0.024 (1.90)+	-0.020 (1.54)
log(AGE_{9596})	-0.071 (7.11)**	-0.072 (7.25)**	-0.073 (7.28)**	-0.076 (7.53)**	-0.077 (7.92)**	-0.077 (7.88)**	-0.073 (7.23)**
MNC_{9596}	0.266 (6.17)**	0.236 (5.76)**	0.262 (6.09)**	0.250 (5.98)**	0.229 (5.61)**	0.229 (5.62)**	0.246 (5.89)**
GOV_{9596}	0.034 (0.88)	0.032 (0.81)	0.038 (0.97)	0.036 (0.91)	0.038 (0.97)	0.039 (0.98)	0.026 (0.66)
EXP_{9596}	0.178 (5.90)**	0.185 (6.16)**	0.175 (5.79)**	0.198 (6.28)**	0.181 (6.02)**	0.181 (6.01)**	0.199 (6.32)**
LEV_{9596}	0.002 (0.75)	0.002 (0.80)	0.002 (0.78)	0.002 (0.76)	0.002 (0.81)	0.002 (0.81)	0.002 (0.77)
$IMDEP_{9596}$	0.085 (2.92)**	0.069 (2.43)*	0.085 (2.92)**	0.072 (2.49)*	0.069 (2.43)*	0.070 (2.44)*	0.067 (2.34)*
$PCI1_{9596}$	-0.000 (2.24)*	-0.000 (2.32)*					
$PSI1_{9596}$	-0.000 (2.99)**		-0.000 (3.02)**				
$PCI2_{9596}$			-0.000 (1.59)	-0.000 (2.01)*	-0.000 (1.94)+	-0.000 (1.93)+	
$PSI2_{9596}$		-0.033 (3.72)**		-0.029 (3.21)**	-0.028 (3.13)**	-0.028 (3.13)**	
DLI_{9596}	0.058 (1.11)	0.052 (1.01)	0.052 (1.01)	0.370 (1.87)+	0.042 (0.81)	0.042 (0.82)	
DCI_{9596}	-0.180 (1.34)	-0.187 (1.39)	-0.185 (1.37)	0.054 (0.26)	-0.223 (1.63)	-0.241 (1.74)+	
IMP_{9596}				0.008 (2.10)*	0.008 (2.17)*	0.008 (2.19)*	0.008 (2.27)*
NRP_{9596}					0.002 (0.94)	0.002 (0.99)	
HHI_{9596}				0.367 (0.68)		0.507 (0.95)	
$CR4_{9596}$					0.102 (0.35)		-0.063 (0.22)
ERP_{9596}				-0.000 (1.69)+			-0.000 (1.34)
Mills ratio	-0.015 (0.15)	-0.008 (0.08)	-0.024 (0.25)	-0.042 (0.42)	-0.067 (0.70)	-0.066 (0.69)	-0.011 (0.11)
Year dummy 1998	-0.210 (12.05)**	-0.212 (12.13)**	-0.210 (11.97)**	-0.214 (11.91)**	-0.205 (11.79)**	-0.205 (11.80)**	-0.217 (12.06)**
Year dummy 1999	-0.239 (11.45)**	-0.240 (11.52)**	-0.236 (11.32)**	-0.240 (11.17)**	-0.230 (11.13)**	-0.230 (11.14)**	-0.244 (11.36)**
Year dummy 2000	-0.151 (6.06)**	-0.152 (6.11)**	-0.148 (5.95)**	-0.147 (5.74)**	-0.140 (5.70)**	-0.140 (5.71)**	-0.153 (5.97)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	
Dummy variables for industries	Included	Included	Included	Included	Included	Included	
Constant	0.287 (1.59)	0.291 (1.61)	0.326 (1.81)+	0.290 (1.63)	0.272 (1.25)	0.273 (1.56)	0.325 (1.49)
R-squared	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Observations	31419	31396	31459	30327	31459	31459	30350

Appendix 8.2 continued

	Dependent variable						
	%ΔROUT						
Specification	(A7.8)	(A7.9)	(A7.10)	(A7.11)	(A7.12)	(A7.13)	(A7.14)
log($SIZE_{9596}$)	0.024	0.023	0.028	0.024	0.023	0.023	0.024
	(2.54)*	(2.38)*	(2.92)**	(2.39)*	(2.49)*	(2.43)*	(2.39)*
log(AGE_{9596})	-0.042	-0.044	-0.043	-0.044	-0.047	-0.047	-0.040
	(5.44)**	(5.69)**	(5.58)**	(5.56)**	(6.15)**	(6.19)**	(5.08)**
MNC_{9596}	0.234	0.216	0.228	0.211	0.214	0.214	0.206
	(7.37)**	(7.17)**	(7.17)**	(6.86)**	(7.13)**	(7.12)**	(6.69)**
GOV_{9596}	0.083	0.090	0.082	0.093	0.090	0.090	0.079
	(3.08)**	(3.35)**	(3.02)**	(3.43)**	(3.34)**	(3.35)**	(2.92)**
EXP_{9596}	0.166	0.169	0.161	0.178	0.162	0.162	0.180
	(6.82)**	(6.95)**	(6.57)**	(7.01)**	(6.65)**	(6.63)**	(7.08)**
LEV_{9596}	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(1.18)	(1.16)	(1.15)	(1.15)	(1.15)	(1.15)	(1.14)
$IMDEP_{9596}$	0.040	0.030	0.041	0.048	0.035	0.035	0.042
	(1.75)+	(1.36)	(1.80)+	(2.12)*	(1.56)	(1.54)	(1.85)+
$PCI1_{9596}$	-0.000	-0.000					
	(2.16)*	(2.26)*					
$PSI1_{9596}$	-0.000		-0.000				
	(2.98)**		(2.14)*				
$PCI2_{9596}$			-0.001	-0.001	-0.001	-0.001	
			(4.89)**	(4.69)**	(4.66)**	(4.66)**	
$PSI2_{9596}$		-0.035		-0.029	-0.029	-0.028	
		(4.74)**		(3.81)**	(3.80)**	(3.79)**	
DLI_{9596}	0.037	0.031	0.033	0.524	0.022	0.022	
	(0.86)	(0.70)	(0.75)	(2.57)*	(0.51)	(0.51)	
DCI_{9596}	-0.265	-0.273	-0.270	0.135	-0.271	-0.268	
	(2.38)*	(2.45)*	(2.42)*	(0.67)	(2.49)*	(2.45)*	
IMP_{9596}				0.010	0.010	0.010	0.011
				(3.03)**	(3.01)**	(3.14)**	(3.20)**
NRP_{9596}					-0.002	-0.001	
					(0.70)	(0.58)	
HHI_{9596}				-0.049		0.096	
				(0.10)		(0.19)	
$CR4_{9596}$					0.116		-0.084
					(0.48)		(0.35)
ERP_{9596}				-0.000			-0.000
				(2.45)*			(1.74)+
Mills ratio	0.289	0.281	0.297	0.287	0.262	0.258	0.329
	(3.69)**	(3.60)**	(3.78)**	(3.55)**	(3.40)**	(3.33)**	(4.09)**
Year dummy 1998	-0.188	-0.187	-0.188	-0.193	-0.185	-0.184	-0.198
	(13.74)**	(13.71)**	(13.75)**	(13.71)**	(13.56)**	(13.52)**	(14.01)**
Year dummy 1999	-0.338	-0.337	-0.338	-0.345	-0.334	-0.333	-0.351
	(20.74)**	(20.71)**	(20.75)**	(20.43)**	(20.62)**	(20.58)**	(20.80)**
Year dummy 2000	-0.237	-0.236	-0.239	-0.242	-0.232	-0.232	-0.249
	(12.28)**	(12.24)**	(12.34)**	(12.07)**	(12.14)**	(12.09)**	(12.48)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	
Dummy variables for industries	Included	Included	Included	Included	Included	Included	
Constant	-0.219	-0.197	-0.178	-0.168	-0.171	-0.111	-0.184
	(1.67)+	(1.50)	(1.36)	(1.26)	(1.01)	(0.86)	(1.06)
R-squared	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Observations	31411	31388	31451	30320	31451	31451	30343

Appendix 8.2 continued

	Dependent variable						
	%ΔEMPL						
Specification	(A7.15)	(A7.16)	(A7.17)	(A7.18)	(A7.19)	(A7.20)	(A7.21)
log($SIZE_{9596}$)	-0.032 (6.22)**	-0.025 (4.76)**	-0.032 (6.18)**	-0.029 (4.99)**	-0.025 (4.77)**	-0.025 (4.80)**	-0.030 (5.16)**
log(AGE_{9596})	-0.037 (9.28)**	-0.037 (9.30)**	-0.036 (9.19)**	-0.036 (8.75)**	-0.036 (9.20)**	-0.036 (9.13)**	-0.037 (8.82)**
MNC_{9596}	0.040 (2.59)**	0.086 (5.79)**	0.043 (2.75)**	0.084 (5.47)**	0.084 (5.68)**	0.084 (5.68)**	0.084 (5.50)**
GOV_{9596}	0.016 (0.78)	0.040 (2.00)*	0.017 (0.84)	0.044 (2.13)*	0.042 (2.08)*	0.042 (2.07)*	0.032 (1.54)
EXP_{9596}	0.091 (7.43)**	0.079 (6.51)**	0.090 (7.38)**	0.081 (6.41)**	0.079 (6.59)**	0.079 (6.61)**	0.082 (6.46)**
LEV_{9596}	-0.001 (1.53)	-0.001 (1.59)	-0.001 (1.56)	-0.001 (1.65)+	-0.001 (1.62)	-0.001 (1.62)	-0.001 (1.69)+
$IMDEP_{9596}$	0.037 (3.41)**	0.058 (5.34)**	0.035 (3.25)**	0.058 (5.27)**	0.051 (4.76)**	0.052 (4.80)**	0.063 (5.76)**
$PCI1_{9596}$	0.000 (1.67)+	0.000 (2.85)**					
$PSI1_{9596}$	0.000 (8.86)**		0.000 (8.12)**				
$PCI2_{9596}$			0.000 (4.39)**	0.001 (7.55)**	0.001 (7.61)**	0.001 (7.61)**	
$PSI2_{9596}$		-0.027 (4.35)**		-0.035 (5.35)**	-0.035 (5.48)**	-0.035 (5.48)**	
DLI_{9596}	0.044 (1.92)+	0.042 (1.84)+	0.042 (1.81)+	0.108 (1.57)	0.038 (1.66)+	0.037 (1.62)	
DCI_{9596}	-0.123 (2.31)*	-0.122 (2.20)*	-0.126 (2.37)*	-0.040 (0.50)	-0.087 (1.60)	-0.083 (1.51)	
IMP_{9596}				0.004 (2.48)*	0.004 (2.74)**	0.004 (2.45)*	0.004 (2.91)**
NRP_{9596}					-0.001 (1.63)	-0.002 (2.19)*	
HHI_{9596}				-0.581 (3.00)**		-0.587 (3.14)**	
$CR4_{9596}$					-0.352 (3.51)**		-0.382 (3.68)**
ERP_{9596}				-0.000 (0.21)			0.000 (0.17)
Mills ratio	0.212 (5.08)**	0.213 (5.16)**	0.218 (5.21)**	0.222 (5.01)**	0.236 (5.66)**	0.235 (5.65)**	0.205 (4.57)**
Year dummy 1998	-0.063 (8.96)**	-0.063 (8.99)**	-0.063 (9.02)**	-0.065 (8.91)**	-0.065 (9.29)**	-0.065 (9.29)**	-0.063 (8.61)**
Year dummy 1999	-0.063 (7.34)**	-0.063 (7.39)**	-0.064 (7.42)**	-0.066 (7.34)**	-0.066 (7.74)**	-0.066 (7.74)**	-0.064 (7.02)**
Year dummy 2000	-0.061 (5.94)**	-0.061 (5.99)**	-0.063 (6.04)**	-0.064 (5.90)**	-0.066 (6.41)**	-0.066 (6.41)**	-0.061 (5.55)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	
Dummy variables for industries	Included	Included	Included	Included	Included	Included	
Constant	0.132 (2.04)*	0.138 (2.14)*	0.129 (2.01)*	0.212 (3.19)**	0.359 (4.80)**	0.222 (3.61)**	0.383 (4.89)**
R-squared	0.07	0.06	0.07	0.07	0.07	0.07	0.06
Observations	31419	31396	31459	30327	31459	31459	30350

Appendix 8.2 continued

	Dependent variable						
	%ΔRVL						
Specification	(A7.22)	(A7.23)	(A7.24)	(A7.25)	(A7.26)	(A7.27)	(A7.28)
log($SIZE_{9596}$)	0.013	0.004	0.013	0.006	-0.002	-0.001	0.005
	(0.96)	(0.27)	(0.99)	(0.45)	(0.13)	(0.10)	(0.39)
log(AGE_{9596})	-0.037	-0.038	-0.039	-0.042	-0.044	-0.044	-0.039
	(3.69)**	(3.81)**	(3.89)**	(4.16)**	(4.51)**	(4.49)**	(3.83)**
MNC_{9596}	0.231	0.150	0.225	0.167	0.145	0.145	0.161
	(5.58)**	(3.78)**	(5.44)**	(4.13)**	(3.65)**	(3.66)**	(3.99)**
GOV_{9596}	-0.008	-0.035	-0.005	-0.033	-0.029	-0.029	-0.033
	(0.19)	(0.83)	(0.12)	(0.77)	(0.70)	(0.69)	(0.77)
EXP_{9596}	0.080	0.100	0.078	0.110	0.096	0.095	0.110
	(2.71)**	(3.41)**	(2.65)**	(3.58)**	(3.26)**	(3.24)**	(3.60)**
LEV_{9596}	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	(1.66)+	(1.78)+	(1.70)+	(1.74)+	(1.78)+	(1.79)+	(1.77)+
$IMDEP_{9596}$	0.055	0.016	0.057	0.018	0.022	0.022	0.008
	(2.01)*	(0.59)	(2.06)*	(0.67)	(0.82)	(0.81)	(0.31)
$PCI1_{9596}$	-0.000	-0.000					
	(2.26)*	(2.41)*					
$PSI1_{9596}$	-0.000		-0.000				
	(7.61)**		(7.20)**				
$PCI2_{9596}$			-0.001	-0.001	-0.001	-0.001	
			(2.89)**	(4.83)**	(4.78)**	(4.77)**	
$PSI2_{9596}$		-0.014		-0.003	-0.002	-0.002	
		(1.20)		(0.26)	(0.15)	(0.15)	
DLI_{9596}	0.017	0.013	0.014	0.269	0.006	0.008	
	(0.34)	(0.26)	(0.28)	(1.62)	(0.13)	(0.16)	
DCI_{9596}	-0.016	-0.027	-0.018	0.134	-0.104	-0.126	
	(0.11)	(0.18)	(0.12)	(0.73)	(0.70)	(0.83)	
IMP_{9596}				0.004	0.004	0.005	0.004
				(1.17)	(1.12)	(1.26)	(1.15)
NRP_{9596}					0.004	0.004	
					(1.54)	(1.76)+	
HHI_{9596}				0.976		1.134	
				(1.84)+		(2.16)*	
$CR4_{9596}$					0.490		0.374
					(1.74)+		(1.34)
ERP_{9596}				-0.000			-0.000
				(1.90)+			(1.73)+
Mills ratio	-0.242	-0.228	-0.257	-0.270	-0.311	-0.309	-0.231
	(2.46)*	(2.33)*	(2.62)**	(2.67)**	(3.21)**	(3.19)**	(2.26)*
Year dummy 1998	-0.146	-0.148	-0.145	-0.148	-0.139	-0.140	-0.152
	(8.50)**	(8.59)**	(8.40)**	(8.33)**	(8.12)**	(8.13)**	(8.53)**
Year dummy 1999	-0.174	-0.176	-0.170	-0.173	-0.163	-0.163	-0.179
	(8.41)**	(8.50)**	(8.25)**	(8.07)**	(7.94)**	(7.96)**	(8.31)**
Year dummy 2000	-0.086	-0.089	-0.083	-0.081	-0.073	-0.073	-0.089
	(3.47)**	(3.57)**	(3.32)**	(3.16)**	(2.95)**	(2.97)**	(3.45)**
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	
Dummy variables for industries	Included	Included	Included	Included	Included	Included	
Constant	0.192	0.184	0.234	0.106	-0.084	0.068	-0.052
	(1.03)	(0.99)	(1.26)	(0.57)	(0.38)	(0.37)	(0.24)
R-squared	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Observations	31419	31396	31459	30327	31459	31459	30350

Appendix 8.2 continued

Appendix 8.2 concluded

	Dependent variable						
	%ΔPCM						
Specification	(A7.29)	(A7.30)	(A7.31)	(A7.32)	(A7.33)	(A7.34)	(A7.35)
log($SIZE_{9596}$)	0.013	0.016	0.015	0.017	0.016	0.017	0.014
	(1.66)+	(2.00)*	(1.86)+	(2.00)*	(2.02)*	(2.08)*	(1.71)+
log(AGE_{9596})	-0.011	-0.010	-0.012	-0.014	-0.013	-0.013	-0.015
	(1.30)	(1.22)	(1.40)	(1.71)+	(1.62)	(1.56)	(1.73)+
MNC_{9596}	0.096	0.108	0.091	0.115	0.101	0.101	0.112
	(3.20)**	(3.79)**	(3.06)**	(3.92)**	(3.53)**	(3.56)**	(3.82)**
GOV_{9596}	-0.112	-0.105	-0.112	-0.101	-0.102	-0.102	-0.105
	(2.39)*	(2.27)*	(2.41)*	(2.16)*	(2.20)*	(2.20)*	(2.23)*
EXP_{9596}	0.053	0.052	0.054	0.058	0.052	0.051	0.058
	(2.14)*	(2.08)*	(2.15)*	(2.22)*	(2.08)*	(2.06)*	(2.21)*
LEV_{9596}	-0.000	-0.001	-0.000	-0.001	-0.000	-0.000	-0.001
	(0.51)	(0.56)	(0.47)	(0.64)	(0.55)	(0.55)	(0.66)
$IMDEP_{9596}$	-0.034	-0.028	-0.033	-0.040	-0.030	-0.030	-0.042
	(1.46)	(1.22)	(1.43)	(1.73)+	(1.29)	(1.30)	(1.78)+
$PCI1_{9596}$	-0.000	-0.000					
	(1.95)+	(1.94)+					
$PSI1_{9596}$	0.000		0.000				
	(1.19)		(0.99)				
$PCI2_{9596}$			-0.000	-0.000	-0.000	-0.000	
			(4.92)**	(3.04)**	(2.69)**	(2.70)**	
$PSI2_{9596}$		-0.024		-0.024	-0.024	-0.024	
		(2.48)*		(2.37)*	(2.35)*	(2.36)*	
DLI_{9596}	0.075	0.073	0.075	0.059	0.068	0.070	
	(1.65)+	(1.63)	(1.65)+	(0.43)	(1.50)	(1.56)	
DCI_{9596}	-0.208	-0.209	-0.207	-0.284	-0.303	-0.324	
	(1.08)	(1.09)	(1.07)	(1.49)	(1.64)	(1.75)+	
IMP_{9596}				-0.002	-0.002	-0.002	-0.002
				(0.24)	(0.33)	(0.23)	(0.30)
NRP_{9596}					0.004	0.005	
					(1.27)	(1.51)	
HHI_{9596}				1.231		1.240	
				(2.22)*		(2.22)*	
$CR4_{9596}$					0.566		0.511
					(2.06)*		(1.90)+
ERP_{9596}				-0.000			-0.000
				(0.74)			(0.80)
Mills ratio	-0.203	-0.190	-0.214	-0.254	-0.243	-0.234	-0.257
	(2.53)*	(2.39)*	(2.65)**	(3.09)**	(3.05)**	(2.94)**	(3.12)**
Year dummy 1998	-0.015	-0.017	-0.015	-0.013	-0.012	-0.013	-0.012
	(1.07)	(1.15)	(1.01)	(0.86)	(0.81)	(0.87)	(0.84)
Year dummy 1999	-0.032	-0.033	-0.030	-0.025	-0.026	-0.027	-0.025
	(1.79)+	(1.88)+	(1.70)+	(1.38)	(1.47)	(1.54)	(1.36)
Year dummy 2000	-0.039	-0.041	-0.037	-0.028	-0.032	-0.033	-0.028
	(1.89)+	(2.00)*	(1.78)+	(1.31)	(1.53)	(1.61)	(1.29)
Dummy variables for provinces	Included	Included	Included	Included	Included	Included	
Dummy variables for industries	Included	Included	Included	Included	Included	Included	
Constant	0.272	0.266	0.282	0.188	-0.107	0.069	0.015
	(1.72)+	(1.70)+	(1.80)+	(1.18)	(0.54)	(0.43)	(0.08)
R-squared	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Observations	30443	30420	30420	29316	30420	30420	29339

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Appendix 8.3 Chow tests for the performance difference equation in the period 1998-2000 period

a) The test for the equation in t = 1998 and 1999

H0: Equation 8.2 in 1998 = Equation 8.2 in 1999
H0: Equation 8.2 in 1998 ≠ Equation 8.2 in 1999

	Dependent variable				
	%ΔRVA	%ΔROUT	%ΔEMPL	%ΔRVL	%ΔPCM2
F-statistics for Chow test	1.69	1.88	0.49	1.66	1.33
5% critical level $F_{100,14745}$	1.24	1.24	1.24	1.24	1.24
Conclusion	Reject H0, The equation in 1998 is not the same with that in 1999	Reject H0, The equation in 1998 is not the same with that in 1999	Accept H0, The equation in 1998 is the same with that in 1999	Reject H0, The equation in 1998 is not the same with that in 1999	Reject H0, The equation in 1998 is not the same with that in 1999

b) The test for the equation in t = 1999 and 2000

H0: Equation 8.2 in 1999 = Equation 8.2 in 2000
H0: Equation 8.2 in 1999 ≠ Equation 8.2 in 2000

	Dependent variable				
	%ΔRVA	%ΔROUT	%ΔEMPL	%ΔRVL	%ΔPCM2
F-statistics for Chow test	1.50	1.69	0.20	1.61	1.31
5% critical level $F_{100,14186}$	1.24	1.24	1.24	1.24	1.24
Conclusion	Reject H0, The equation in 1998 is not the same with that in 1999	Reject H0, The equation in 1998 is not the same with that in 1999	Accept H0, The equation in 1998 is the same with that in 1999	Reject H0, The equation in 1998 is not the same with that in 1999	Accept H0, The equation in 1998 is the same with that in 1999

Appendix 8.4 Complete regression results of Table 8.9

Table A8.1 Dependent variable: $\%\Delta RVA$

	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
$\log(SIZE_{9596})$	-0.020 (0.65)	0.055 (1.96)+	0.055 (1.70)+	-0.030 (1.00)	0.049 (1.74)+	0.042 (1.31)	-0.049 (1.36)	0.042 (1.32)	0.049 (1.35)
$\log(AGE_{9596})$	-0.089 (3.65)**	-0.051 (2.33)*	-0.048 (1.99)*	-0.092 (3.77)**	-0.052 (2.38)*	-0.052 (2.18)*	-0.100 (3.86)**	-0.055 (2.39)*	-0.048 (1.93)+
FOR_{9596}	-0.093 (0.77)	0.075 (0.70)	0.158 (1.46)	0.244 (2.60)**	0.304 (3.62)**	0.419 (4.99)**	0.237 (2.51)*	0.302 (3.60)**	0.420 (5.00)**
GOV_{9596}	0.093 (1.20)	-0.010 (0.12)	0.018 (0.19)	0.095 (1.23)	-0.009 (0.10)	0.021 (0.23)	0.102 (1.30)	-0.005 (0.05)	0.019 (0.21)
EXP_{9596}	0.175 (2.58)**	0.127 (1.79)+	0.028 (0.37)	0.315 (4.91)**	0.228 (3.42)**	0.141 (2.00)*	-0.018 (0.06)	0.094 (0.33)	0.142 (0.46)
$EXP_{9596}*FOR_{9596}$	0.936 (4.41)**	0.637 (3.14)**	0.722 (3.54)**						
$EXP_{9596}*LEV_{9596}$				0.002 (0.29)	-0.001 (0.13)	0.002 (0.26)			
$EXP_{9596}*\log(SIZE_{9596})$							0.064 (1.18)	0.025 (0.49)	-0.000 (0.00)
LEV_{9596}	-0.000 (0.06)	0.005 (1.03)	0.004 (0.83)	-0.001 (0.21)	0.005 (1.00)	0.003 (0.63)	-0.001 (0.11)	0.004 (1.00)	0.004 (0.80)
$IMDEP_{9596}$	0.010 (0.17)	0.058 (0.97)	0.133 (2.14)*	0.015 (0.25)	0.063 (1.04)	0.137 (2.19)*	0.014 (0.22)	0.061 (1.01)	0.137 (2.19)*
$PCI2_{9596}$	-0.000 (1.19)	-0.001 (1.39)	-0.001 (1.37)	-0.001 (1.39)	-0.001 (1.53)	-0.001 (1.53)	-0.001 (1.34)	-0.001 (1.51)	-0.001 (1.52)
$PSI2_{9596}$	-0.023 (1.25)	-0.032 (1.63)	-0.053 (2.74)**	-0.028 (1.54)	-0.036 (1.81)+	-0.057 (2.93)**	-0.027 (1.49)	-0.036 (1.83)+	-0.058 (2.99)**
$CR4_{9596}$	0.091 (0.16)	-0.231 (0.35)	-0.142 (0.21)	0.060 (0.10)	-0.273 (0.40)	-0.143 (0.21)	0.131 (0.23)	-0.254 (0.37)	-0.208 (0.30)
IMP_{9596}	0.014 (1.71)+	0.010 (1.17)	0.009 (1.02)	0.014 (1.74)+	0.010 (1.18)	0.009 (0.99)	0.015 (1.83)+	0.010 (1.20)	0.009 (1.03)
ERP_{9596}	-0.000 (0.54)	-0.001 (1.42)	-0.000 (0.58)	-0.000 (0.65)	-0.001 (1.53)	-0.000 (0.65)	-0.000 (0.54)	-0.001 (1.49)	-0.000 (0.67)
Mills ratio	-0.070 (0.32)	0.310 (1.64)	0.428 (2.10)*	-0.094 (0.42)	0.306 (1.62)	0.384 (1.88)+	-0.175 (0.75)	0.283 (1.43)	0.434 (2.02)*
Constant	0.164 (0.36)	-0.447 (0.91)	-0.764 (1.59)	0.229 (0.50)	-0.402 (0.80)	-0.679 (1.40)	0.331 (0.70)	-0.366 (0.73)	-0.717 (1.45)
R-squared	0.07	0.08	0.08	0.06	0.08	0.07	0.06	0.08	0.07

Table A8.1 continued

Table A8.1 concluded

	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	-0.031	0.047	0.044	-0.030	0.050	0.049	-0.027	0.051	0.048
	(1.03)	(1.66)+	(1.37)	(0.99)	(1.79)+	(1.53)	(0.87)	(1.81)+	(1.48)
log(AGE_{9596})	-0.091	-0.053	-0.051	-0.091	-0.052	-0.049	-0.090	-0.051	-0.049
	(3.77)**	(2.42)*	(2.11)*	(3.77)**	(2.36)*	(2.02)*	(3.67)**	(2.32)*	(2.05)*
FOR_{9596}	0.246	0.304	0.421	0.243	0.297	0.413	0.210	0.282	0.395
	(2.62)**	(3.63)**	(5.01)**	(2.61)**	(3.55)**	(4.92)**	(2.16)*	(3.31)**	(4.64)**
GOV_{9596}	0.096	-0.007	0.021	0.095	-0.012	0.016	0.096	-0.009	0.021
	(1.24)	(0.09)	(0.23)	(1.22)	(0.14)	(0.18)	(1.24)	(0.10)	(0.23)
EXP_{9596}	0.316	0.226	0.141	0.317	0.226	0.142	0.241	0.177	0.085
	(4.93)**	(3.41)**	(2.00)*	(4.94)**	(3.41)**	(2.01)*	(3.56)**	(2.45)*	(1.09)
LEV_{9596}	-0.021	-0.005	-0.012	-0.001	-0.000	-0.001	-0.001	0.004	0.004
	(1.13)	(0.34)	(0.62)	(0.12)	(0.00)	(0.09)	(0.11)	(0.98)	(0.78)
LEV_{9596}*FOR_{9596}				0.000	0.028	0.028			
				(0.01)	(1.78)+	(2.00)*			
LEV_{9596}*log($SIZE_{9596}$)	0.004	0.002	0.003						
	(1.34)	(0.79)	(0.95)						
$IMDEP_{9596}$	0.016	0.062	0.137	0.016	0.064	0.139	-0.060	0.014	0.083
	(0.26)	(1.03)	(2.19)*	(0.26)	(1.05)	(2.22)*	(0.92)	(0.22)	(1.22)
$IMDEP_{9596}$*EXP_{9596}							0.440	0.285	0.314
							(2.14)*	(1.48)	(1.64)
$PCI2_{9596}$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(1.39)	(1.54)	(1.53)	(1.39)	(1.62)	(1.61)	(1.40)	(1.56)	(1.54)
$PSI2_{9596}$	-0.028	-0.036	-0.057	-0.028	-0.036	-0.057	-0.026	-0.035	-0.055
	(1.53)	(1.79)+	(2.93)**	(1.55)	(1.81)+	(2.97)**	(1.43)	(1.73)+	(2.85)**
$CR4_{9596}$	0.060	-0.260	-0.169	0.058	-0.288	-0.211	0.050	-0.276	-0.173
	(0.10)	(0.38)	(0.24)	(0.10)	(0.42)	(0.31)	(0.09)	(0.41)	(0.25)
IMP_{9596}	0.014	0.010	0.009	0.014	0.010	0.009	0.014	0.010	0.009
	(1.74)+	(1.18)	(1.00)	(1.74)+	(1.18)	(1.03)	(1.73)+	(1.18)	(1.02)
ERP_{9596}	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000
	(0.67)	(1.53)	(0.67)	(0.65)	(1.48)	(0.63)	(0.53)	(1.42)	(0.57)
Mills ratio	-0.093	0.295	0.404	-0.091	0.310	0.428	-0.077	0.316	0.415
	(0.42)	(1.56)	(1.98)*	(0.42)	(1.65)+	(2.10)*	(0.35)	(1.66)+	(2.02)*
Constant	0.231	-0.392	-0.692	0.227	-0.402	-0.708	0.207	-0.420	-0.715
	(0.50)	(0.78)	(1.42)	(0.50)	(0.80)	(1.46)	(0.45)	(0.84)	(1.47)
R-squared	0.06	0.08	0.07	0.06	0.08	0.08	0.06	0.08	0.08

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Table A8.2 Dependent variable: %Δ*ROUT*

	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	0.030	0.054	0.088	0.026	0.051	0.082	0.012	0.041	0.080
	(1.32)	(2.25)*	(3.29)**	(1.11)	(2.14)*	(3.05)**	(0.43)	(1.45)	(2.56)*
log(AGE_{9596})	-0.045	-0.031	-0.026	-0.046	-0.031	-0.028	-0.052	-0.035	-0.029
	(2.34)*	(1.69)+	(1.33)	(2.41)*	(1.68)+	(1.40)	(2.59)**	(1.84)+	(1.37)
FOR_{9596}	0.029	0.079	0.153	0.189	0.240	0.355	0.184	0.238	0.355
	(0.31)	(0.90)	(1.78)+	(2.81)**	(3.59)**	(5.50)**	(2.73)**	(3.54)**	(5.49)**
GOV_{9596}	0.091	0.108	0.126	0.092	0.108	0.127	0.098	0.115	0.129
	(1.67)+	(1.80)+	(1.99)*	(1.68)+	(1.79)+	(2.02)*	(1.76)+	(1.88)+	(2.02)*
EXP_{9596}	0.264	0.114	0.025	0.333	0.187	0.115	0.086	0.036	0.059
	(4.90)**	(1.90)+	(0.38)	(6.50)**	(3.33)**	(1.94)+	(0.36)	(0.15)	(0.23)
EXP_{9596}*FOR_{9596}	0.445	0.449	0.561						
	(2.78)**	(2.74)**	(3.53)**						
EXP_{9596}*LEV_{9596}				-0.004	-0.003	-0.002			
				(0.37)	(0.54)	(0.39)			
EXP_{9596}*log($SIZE_{9596}$)							0.047	0.028	0.010
							(1.07)	(0.64)	(0.21)
LEV_{9596}	-0.005	-0.002	-0.002	-0.005	-0.001	-0.002	-0.006	-0.002	-0.002
	(0.81)	(0.36)	(0.32)	(0.67)	(0.23)	(0.23)	(0.84)	(0.38)	(0.34)
$IMDEP_{9596}$	0.013	0.012	0.080	0.017	0.016	0.085	0.014	0.013	0.083
	(0.28)	(0.24)	(1.58)	(0.36)	(0.32)	(1.66)+	(0.30)	(0.26)	(1.62)
$PCI2_{9596}$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(2.13)*	(2.46)*	(2.39)*	(2.27)*	(2.61)**	(2.57)*	(2.23)*	(2.58)**	(2.56)*
$PSI2_{9596}$	-0.023	-0.042	-0.040	-0.025	-0.045	-0.043	-0.025	-0.045	-0.044
	(1.46)	(2.18)*	(2.46)*	(1.62)	(2.31)*	(2.64)**	(1.62)	(2.34)*	(2.68)**
$CR4_{9596}$	0.118	-0.282	-0.079	0.103	-0.326	-0.109	0.157	-0.276	-0.104
	(0.25)	(0.52)	(0.13)	(0.22)	(0.59)	(0.18)	(0.33)	(0.50)	(0.17)
IMP_{9596}	0.015	0.010	0.005	0.015	0.010	0.005	0.016	0.010	0.005
	(2.27)*	(1.34)	(0.49)	(2.28)*	(1.35)	(0.48)	(2.39)*	(1.39)	(0.49)
ERP_{9596}	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.79)	(1.29)	(1.08)	(0.89)	(1.39)	(1.16)	(0.73)	(1.32)	(1.14)
Mills ratio	0.302	0.488	0.623	0.294	0.497	0.612	0.230	0.447	0.607
	(1.69)+	(2.96)**	(3.52)**	(1.65)+	(3.03)**	(3.45)**	(1.22)	(2.56)*	(3.22)**
Constant	-0.139	-0.749	-1.410	-0.111	-0.727	-1.363	-0.032	-0.668	-1.354
	(0.43)	(1.98)*	(3.34)**	(0.34)	(1.90)+	(3.22)**	(0.09)	(1.72)+	(3.14)**
R-squared	0.09	0.09	0.08	0.09	0.09	0.08	0.09	0.09	0.08

Table A8.2 continued

Table A782 concluded

	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	0.025	0.048	0.080	0.025	0.050	0.084	0.028	0.052	0.083
	(1.08)	(2.00)*	(2.95)**	(1.10)	(2.11)*	(3.13)**	(1.20)	(2.15)*	(3.07)**
log(AGE_{9596})	-0.046	-0.032	-0.029	-0.046	-0.031	-0.027	-0.045	-0.031	-0.028
	(2.40)*	(1.76)+	(1.43)	(2.43)*	(1.73)+	(1.36)	(2.35)*	(1.67)+	(1.38)
FOR_{9596}	0.190	0.240	0.357	0.188	0.235	0.350	0.167	0.217	0.331
	(2.83)**	(3.60)**	(5.52)**	(2.81)**	(3.51)**	(5.42)**	(2.47)*	(3.18)**	(5.07)**
GOV_{9596}	0.093	0.110	0.129	0.092	0.106	0.124	0.093	0.109	0.128
	(1.69)+	(1.83)+	(2.04)*	(1.68)+	(1.77)+	(1.97)*	(1.69)+	(1.82)+	(2.03)*
EXP_{9596}	0.331	0.184	0.112	0.331	0.184	0.113	0.281	0.134	0.057
	(6.47)**	(3.28)**	(1.89)+	(6.47)**	(3.28)**	(1.90)+	(5.11)**	(2.19)*	(0.88)
LEV_{9596}	-0.017	-0.012	-0.018	-0.006	-0.006	-0.006	-0.006	-0.002	-0.002
	(0.71)	(0.58)	(0.75)	(0.88)	(0.82)	(0.72)	(0.84)	(0.39)	(0.36)
LEV_{9596}*FOR_{9596}				0.004	0.023	0.024			
				(0.12)	(1.08)	(1.30)			
LEV_{9596}*log($SIZE_{9596}$)	0.002	0.002	0.003						
	(0.60)	(0.60)	(0.82)						
$IMDEP_{9596}$	0.016	0.014	0.083	0.016	0.016	0.085	-0.034	-0.034	0.030
	(0.34)	(0.29)	(1.64)	(0.34)	(0.31)	(1.66)+	(0.64)	(0.61)	(0.53)
$IMDEP_{9596}$*EXP_{9596}							0.289	0.289	0.308
							(1.82)+	(1.86)+	(1.95)+
$PCI2_{9596}$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(2.28)*	(2.62)**	(2.58)**	(2.30)*	(2.71)**	(2.67)**	(2.33)*	(2.68)**	(2.65)**
$PSI2_{9596}$	-0.025	-0.044	-0.043	-0.025	-0.045	-0.043	-0.024	-0.043	-0.041
	(1.60)	(2.28)*	(2.61)**	(1.61)	(2.30)*	(2.65)**	(1.52)	(2.22)*	(2.53)*
$CR4_{9596}$	0.101	-0.304	-0.099	0.105	-0.321	-0.130	0.098	-0.312	-0.098
	(0.21)	(0.55)	(0.16)	(0.22)	(0.58)	(0.22)	(0.21)	(0.57)	(0.16)
IMP_{9596}	0.015	0.010	0.004	0.015	0.010	0.005	0.015	0.010	0.005
	(2.28)*	(1.35)	(0.48)	(2.29)*	(1.36)	(0.49)	(2.28)*	(1.35)	(0.49)
ERP_{9596}	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.89)	(1.38)	(1.16)	(0.86)	(1.33)	(1.12)	(0.75)	(1.25)	(1.04)
Mills ratio	0.293	0.478	0.604	0.289	0.486	0.621	0.301	0.492	0.611
	(1.65)+	(2.90)**	(3.39)**	(1.63)	(2.97)**	(3.51)**	(1.68)+	(2.97)**	(3.41)**
Constant	-0.109	-0.711	-1.354	-0.107	-0.715	-1.366	-0.123	-0.734	-1.375
	(0.33)	(1.86)+	(3.19)**	(0.33)	(1.87)+	(3.22)**	(0.38)	(1.93)+	(3.25)**
R-squared	0.09	0.09	0.08	0.09	0.09	0.08	0.09	0.09	0.08

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Table A8.3 Dependent variable: $\%\Delta EMPL$

	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	-0.036	-0.045	-0.041	-0.036	-0.046	-0.042	-0.035	-0.049	-0.040
	(2.67)**	(2.93)**	(2.48)*	(2.68)**	(3.01)**	(2.62)**	(2.46)*	(3.11)**	(2.40)*
log(AGE_{9596})	-0.030	-0.048	-0.060	-0.030	-0.049	-0.061	-0.029	-0.049	-0.060
	(2.89)**	(4.57)**	(5.48)**	(2.88)**	(4.63)**	(5.55)**	(2.84)**	(4.77)**	(5.46)**
FOR_{9596}	0.086	0.052	0.043	0.104	0.072	0.096	0.104	0.071	0.096
	(2.15)*	(1.30)	(0.96)	(3.35)**	(2.24)*	(2.78)**	(3.32)**	(2.19)*	(2.77)**
GOV_{9596}	0.095	0.068	0.059	0.095	0.068	0.059	0.094	0.070	0.058
	(2.26)*	(1.54)	(1.26)	(2.26)*	(1.55)	(1.27)	(2.26)*	(1.60)	(1.25)
EXP_{9596}	0.082	0.114	0.087	0.088	0.121	0.108	0.110	0.056	0.141
	(2.95)**	(3.68)**	(2.66)**	(3.53)**	(4.34)**	(3.65)**	(1.06)	(0.52)	(1.14)
EXP_{9596}*FOR_{9596}	0.049	0.057	0.146						
	(0.72)	(0.74)	(1.81)+						
EXP_{9596}*log($SIZE_{9596}$)							-0.004	0.013	-0.006
							(0.20)	(0.60)	(0.26)
EXP_{9596}*LEV_{9596}				0.003	0.004	0.005			
				(1.58)	(1.25)	(1.35)			
LEV_{9596}	-0.001	-0.002	-0.002	-0.002	-0.003	-0.003	-0.001	-0.002	-0.002
	(0.65)	(1.05)	(0.94)	(1.02)	(1.24)	(1.27)	(0.65)	(1.07)	(0.95)
$IMDEP_{9596}$	0.048	0.033	0.063	0.049	0.033	0.063	0.049	0.033	0.064
	(2.21)*	(1.37)	(2.46)*	(2.22)*	(1.37)	(2.47)*	(2.22)*	(1.37)	(2.49)*
$PCI2_{9596}$	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(4.28)**	(3.69)**	(4.04)**	(4.25)**	(3.66)**	(3.95)**	(4.24)**	(3.67)**	(3.95)**
$PSI2_{9596}$	-0.046	-0.035	-0.030	-0.046	-0.036	-0.031	-0.046	-0.036	-0.031
	(3.54)**	(2.39)*	(2.27)*	(3.57)**	(2.41)*	(2.33)*	(3.58)**	(2.40)*	(2.35)*
$CR4_{9596}$	-0.483	-0.422	-0.182	-0.489	-0.422	-0.188	-0.492	-0.415	-0.202
	(2.38)*	(1.90)+	(0.67)	(2.42)*	(1.91)+	(0.69)	(2.45)*	(1.89)+	(0.75)
IMP_{9596}	0.004	0.005	0.008	0.004	0.005	0.008	0.004	0.005	0.008
	(1.40)	(1.67)+	(1.85)+	(1.40)	(1.68)+	(1.85)+	(1.41)	(1.70)+	(1.86)+
ERP_{9596}	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.58)	(0.88)	(0.61)	(0.60)	(0.88)	(0.59)	(0.62)	(0.90)	(0.55)
Mills ratio	0.197	0.139	0.155	0.200	0.135	0.150	0.203	0.127	0.162
	(1.91)+	(1.36)	(1.47)	(1.95)+	(1.33)	(1.43)	(1.99)*	(1.26)	(1.55)
Constant	0.404	0.583	0.352	0.405	0.590	0.366	0.400	0.605	0.353
	(2.66)**	(3.40)**	(1.72)+	(2.67)**	(3.45)**	(1.80)+	(2.59)**	(3.50)**	(1.72)+
R-squared	0.09	0.08	0.08	0.09	0.08	0.08	0.09	0.08	0.08

Table A8.3 continued

Table A8.3 concluded

	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	-0.036	-0.044	-0.041	-0.034	-0.044	-0.040	-0.036	-0.047	-0.043
	(2.67)**	(2.88)**	(2.50)*	(2.59)**	(2.91)**	(2.50)*	(2.73)**	(3.05)**	(2.61)**
log(AGE_{9596})	-0.030	-0.048	-0.060	-0.029	-0.048	-0.060	-0.031	-0.049	-0.061
	(2.89)**	(4.55)**	(5.48)**	(2.80)**	(4.55)**	(5.47)**	(2.96)**	(4.66)**	(5.54)**
FOR_{9596}	0.103	0.071	0.094	0.101	0.069	0.092	0.089	0.055	0.082
	(3.33)**	(2.19)*	(2.73)**	(3.28)**	(2.15)*	(2.67)**	(2.74)**	(1.66)+	(2.31)*
GOV_{9596}	0.094	0.067	0.058	0.093	0.066	0.057	0.096	0.070	0.060
	(2.26)*	(1.51)	(1.25)	(2.23)*	(1.50)	(1.23)	(2.29)*	(1.59)	(1.29)
EXP_{9596}	0.089	0.123	0.111	0.089	0.122	0.110	0.056	0.086	0.079
	(3.58)**	(4.44)**	(3.74)**	(3.57)**	(4.40)**	(3.71)**	(2.00)*	(2.70)**	(2.31)*
LEV_{9596}	0.002	0.012	0.011	-0.003	-0.004	-0.004	-0.001	-0.002	-0.002
	(0.48)	(1.68)+	(1.53)	(1.45)	(1.64)	(1.71)+	(0.69)	(1.10)	(0.99)
LEV_{9596}*FOR_{9596}				0.012	0.013	0.016			
				(2.52)*	(2.53)*	(3.15)**			
LEV_{9596}*log($SIZE_{9596}$)	-0.001	-0.003	-0.003						
	(0.86)	(2.00)*	(1.87)+						
$IMDEP_{9596}$	0.049	0.033	0.064	0.049	0.034	0.065	0.016	-0.003	0.034
	(2.23)*	(1.39)	(2.49)*	(2.26)*	(1.42)	(2.52)*	(0.65)	(0.10)	(1.20)
$IMDEP_{9596}$*EXP_{9596}							0.188	0.209	0.170
							(2.69)**	(2.83)**	(2.23)*
$PCI2_{9596}$	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(4.25)**	(3.67)**	(3.96)**	(4.20)**	(3.60)**	(3.89)**	(4.10)**	(3.52)**	(3.84)**
$PSI2_{9596}$	-0.046	-0.036	-0.031	-0.046	-0.036	-0.031	-0.045	-0.034	-0.030
	(3.58)**	(2.44)*	(2.36)*	(3.59)**	(2.43)*	(2.36)*	(3.47)**	(2.31)*	(2.25)*
$CR4_{9596}$	-0.487	-0.432	-0.201	-0.504	-0.437	-0.209	-0.470	-0.401	-0.175
	(2.40)*	(1.96)+	(0.74)	(2.49)*	(1.98)*	(0.77)	(2.32)*	(1.82)+	(0.64)
IMP_{9596}	0.004	0.005	0.008	0.004	0.005	0.008	0.004	0.005	0.008
	(1.40)	(1.68)+	(1.86)+	(1.38)	(1.68)+	(1.87)+	(1.43)	(1.67)+	(1.84)+
ERP_{9596}	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.59)	(0.89)	(0.59)	(0.59)	(0.90)	(0.62)	(0.41)	(1.05)	(0.70)
Mills ratio	0.198	0.143	0.159	0.210	0.145	0.162	0.186	0.123	0.145
	(1.92)+	(1.41)	(1.51)	(2.06)*	(1.43)	(1.55)	(1.80)+	(1.20)	(1.37)
Constant	0.406	0.582	0.358	0.400	0.584	0.359	0.409	0.591	0.363
	(2.67)**	(3.39)**	(1.75)+	(2.64)**	(3.41)**	(1.76)+	(2.70)**	(3.44)**	(1.77)+
R-squared	0.09	0.08	0.08	0.09	0.08	0.08	0.09	0.08	0.08

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Table A8.4 Dependent variable: %ΔRVL

	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	0.012	0.098	0.092	0.002	0.092	0.081	-0.017	0.089	0.086
	(0.39)	(3.32)**	(2.72)**	(0.07)	(3.16)**	(2.43)*	(0.45)	(2.73)**	(2.31)*
log(AGE_{9596})	-0.062	-0.005	0.010	-0.064	-0.006	0.006	-0.073	-0.007	0.009
	(2.46)*	(0.23)	(0.40)	(2.58)*	(0.25)	(0.24)	(2.74)**	(0.30)	(0.36)
FOR_{9596}	-0.175	0.028	0.122	0.140	0.232	0.323	0.133	0.232	0.324
	(1.46)	(0.27)	(1.15)	(1.52)	(2.92)**	(4.05)**	(1.44)	(2.91)**	(4.05)**
GOV_{9596}	-0.026	-0.104	-0.067	-0.024	-0.103	-0.064	-0.017	-0.101	-0.065
	(0.33)	(1.10)	(0.68)	(0.30)	(1.09)	(0.64)	(0.22)	(1.07)	(0.66)
EXP_{9596}	0.089	0.010	-0.063	0.221	0.101	0.026	-0.124	0.045	0.004
	(1.32)	(0.14)	(0.85)	(3.47)**	(1.58)	(0.38)	(0.44)	(0.17)	(0.01)
EXP_{9596}*FOR_{9596}	0.876	0.570	0.560						
	(4.25)**	(3.00)**	(2.88)**						
EXP_{9596}*log($SIZE_{9596}$)							0.067	0.010	0.004
							(1.23)	(0.20)	(0.07)
EXP_{9596}*LEV_{9596}				-0.001	-0.005	-0.003			
				(0.12)	(0.97)	(0.67)			
LEV_{9596}	0.001	0.006	0.006	0.001	0.008	0.006	0.001	0.006	0.006
	(0.18)	(1.95)+	(1.64)	(0.24)	(1.98)*	(1.56)	(0.12)	(1.92)+	(1.61)
$IMDEP_{9596}$	-0.033	0.030	0.075	-0.028	0.035	0.079	-0.030	0.033	0.078
	(0.57)	(0.53)	(1.29)	(0.49)	(0.61)	(1.34)	(0.51)	(0.58)	(1.34)
$PCI2_{9596}$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(2.84)**	(2.69)**	(2.88)**	(3.03)**	(2.81)**	(3.00)**	(2.98)**	(2.81)**	(3.00)**
$PSI2_{9596}$	0.014	-0.006	-0.033	0.009	-0.010	-0.036	0.010	-0.010	-0.036
	(0.55)	(0.22)	(1.25)	(0.34)	(0.35)	(1.36)	(0.39)	(0.35)	(1.40)
$CR4_{9596}$	0.615	0.226	0.090	0.590	0.183	0.094	0.661	0.194	0.041
	(1.08)	(0.34)	(0.13)	(1.02)	(0.27)	(0.14)	(1.14)	(0.29)	(0.06)
IMP_{9596}	0.010	0.004	0.001	0.010	0.004	0.001	0.011	0.005	0.001
	(1.22)	(0.54)	(0.14)	(1.26)	(0.55)	(0.11)	(1.35)	(0.56)	(0.15)
ERP_{9596}	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000
	(0.45)	(2.06)*	(0.97)	(0.55)	(2.17)*	(1.04)	(0.44)	(2.14)*	(1.04)
Mills ratio	0.068	0.063	0.386	0.081	0.058	0.384	0.035	0.031	0.331
	(0.58)	(0.39)	(2.72)**	(0.69)	(0.37)	(2.73)**	(0.29)	(0.20)	(2.32)*
Constant	-0.226	-1.022	-1.102	-0.162	-0.985	-1.034	-0.058	-0.967	-1.061
	(0.49)	(2.04)*	(2.28)*	(0.35)	(1.93)+	(2.12)*	(0.12)	(1.88)+	(2.15)*
R-squared	0.05	0.08	0.07	0.05	0.08	0.07	0.05	0.08	0.07

Table A8.4 continued

Table A8.4 concluded

	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
$\log(SIZE_{9596})$	0.001	0.089	0.081	0.001	0.092	0.086	0.006	0.095	0.087
	(0.03)	(3.02)**	(2.41)*	(0.02)	(3.15)**	(2.56)*	(0.19)	(3.24)**	(2.57)*
$\log(AGE_{9596})$	-0.064	-0.007	0.007	-0.065	-0.006	0.008	-0.062	-0.004	0.009
	(2.57)*	(0.33)	(0.27)	(2.62)**	(0.28)	(0.34)	(2.45)*	(0.18)	(0.36)
FOR_{9596}	0.143	0.234	0.327	0.142	0.229	0.321	0.120	0.226	0.312
	(1.55)	(2.95)**	(4.09)**	(1.55)	(2.89)**	(4.02)**	(1.26)	(2.80)**	(3.83)**
GOV_{9596}	-0.023	-0.100	-0.063	-0.023	-0.104	-0.067	-0.024	-0.104	-0.065
	(0.29)	(1.06)	(0.63)	(0.29)	(1.10)	(0.67)	(0.30)	(1.11)	(0.66)
EXP_{9596}	0.221	0.097	0.023	0.221	0.098	0.025	0.175	0.083	-0.003
	(3.46)**	(1.52)	(0.34)	(3.48)**	(1.54)	(0.36)	(2.59)**	(1.19)	(0.04)
LEV_{9596}	-0.023	-0.017	-0.024	0.002	0.004	0.004	0.001	0.006	0.006
	(1.45)	(1.17)	(1.23)	(0.88)	(1.14)	(0.81)	(0.13)	(1.92)+	(1.59)
$LEV_{9596}*FOR_{9596}$				-0.012	0.015	0.012			
				(0.46)	(1.17)	(1.09)			
$LEV_{9596}*\log(SIZE_{9596})$	0.005	0.005	0.006						
	(1.73)+	(1.67)+	(1.61)						
$IMDEP_{9596}$	-0.028	0.033	0.078	-0.029	0.034	0.079	-0.074	0.019	0.052
	(0.48)	(0.59)	(1.34)	(0.49)	(0.60)	(1.35)	(1.21)	(0.30)	(0.83)
$IMDEP_{9596}*EXP_{9596}$							0.268	0.091	0.153
							(1.33)	(0.50)	(0.84)
$PCI2_{9596}$	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(3.03)**	(2.82)**	(3.01)**	(3.00)**	(2.85)**	(3.03)**	(3.05)**	(2.83)**	(3.03)**
$PSI2_{9596}$	0.009	-0.009	-0.035	0.009	-0.010	-0.036	0.010	-0.010	-0.035
	(0.35)	(0.33)	(1.35)	(0.35)	(0.35)	(1.38)	(0.38)	(0.34)	(1.35)
$CR4_{9596}$	0.590	0.209	0.084	0.605	0.187	0.050	0.563	0.162	0.054
	(1.02)	(0.31)	(0.12)	(1.05)	(0.28)	(0.07)	(0.98)	(0.24)	(0.08)
IMP_{9596}	0.010	0.004	0.001	0.010	0.004	0.001	0.010	0.004	0.001
	(1.25)	(0.55)	(0.11)	(1.26)	(0.55)	(0.13)	(1.23)	(0.55)	(0.14)
ERP_{9596}	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000	-0.000	-0.001	-0.000
	(0.57)	(2.17)*	(1.06)	(0.56)	(2.13)*	(1.03)	(0.49)	(2.13)*	(0.99)
Mills ratio	0.061	0.050	0.376	0.087	0.068	0.385	0.080	0.063	0.381
	(0.52)	(0.31)	(2.66)**	(0.75)	(0.43)	(2.75)**	(0.68)	(0.39)	(2.67)**
Constant	-0.160	-0.965	-1.037	-0.157	-0.977	-1.055	-0.187	-1.002	-1.066
	(0.34)	(1.90)+	(2.13)*	(0.34)	(1.92)+	(2.17)*	(0.40)	(1.97)*	(2.19)*
R-squared	0.05	0.08	0.07	0.05	0.08	0.07	0.05	0.08	0.07

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Table A8.5 Dependent variable: *%ΔPCM*

	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
$\log(SIZE_{9596})$	0.011 (0.73)	-0.009 (0.34)	0.051 (2.38)*	0.013 (0.85)	-0.011 (0.42)	0.049 (2.29)*	0.003 (0.19)	-0.018 (0.71)	0.034 (1.50)
$\log(AGE_{9596})$	-0.047 (2.70)**	-0.009 (0.41)	0.014 (0.71)	-0.048 (2.76)**	-0.011 (0.49)	0.011 (0.54)	-0.053 (2.97)**	-0.012 (0.55)	0.009 (0.43)
FOR_{9596}	-0.010 (0.15)	0.015 (0.18)	0.037 (0.47)	0.098 (1.69)+	0.125 (1.88)+	0.147 (2.32)*	0.093 (1.60)	0.123 (1.85)+	0.145 (2.29)*
GOV_{9596}	0.031 (0.42)	-0.225 (1.81)+	-0.191 (1.83)+	0.031 (0.42)	-0.223 (1.79)+	-0.189 (1.81)+	0.036 (0.49)	-0.221 (1.78)+	-0.183 (1.76)+
EXP_{9596}	-0.021 (0.37)	0.047 (0.66)	0.011 (0.16)	0.019 (0.38)	0.091 (1.50)	0.061 (1.05)	-0.235 (1.15)	-0.110 (0.49)	-0.269 (1.23)
$EXP_{9596}*FOR_{9596}$	0.295 (2.10)*	0.303 (1.73)+	0.304 (1.95)+						
$EXP_{9596}*LEV_{9596}$				0.007 (1.44)	0.002 (0.28)	-0.006 (1.09)			
$EXP_{9596}*\log(SIZE_{9596})$							0.050 (1.33)	0.039 (0.95)	0.062 (1.53)
LEV_{9596}	0.000 (0.14)	-0.000 (0.02)	-0.001 (0.67)	0.000 (0.18)	0.000 (0.05)	0.001 (0.48)	0.000 (0.11)	-0.000 (0.06)	-0.002 (0.72)
$IMDEP_{9596}$	-0.092 (2.02)*	-0.024 (0.46)	0.011 (0.21)	-0.093 (2.03)*	-0.024 (0.46)	0.012 (0.24)	-0.092 (2.01)*	-0.024 (0.45)	0.010 (0.21)
$PCI2_{9596}$	-0.000 (2.16)*	-0.000 (0.87)	-0.000 (0.54)	-0.000 (2.13)*	-0.000 (0.94)	-0.000 (0.60)	-0.000 (2.10)*	-0.000 (0.90)	-0.000 (0.54)
$PSI2_{9596}$	-0.031 (1.07)	-0.027 (1.37)	-0.044 (2.78)**	-0.033 (1.14)	-0.029 (1.45)	-0.045 (2.93)**	-0.032 (1.12)	-0.029 (1.47)	-0.046 (2.94)**
$CR4_{9596}$	0.596 (1.20)	0.434 (0.65)	0.919 (1.40)	0.591 (1.18)	0.440 (0.65)	0.945 (1.44)	0.632 (1.27)	0.434 (0.65)	0.942 (1.43)
IMP_{9596}	0.001 (0.08)	-0.001 (0.09)	-0.001 (0.09)	0.001 (0.09)	-0.001 (0.09)	-0.002 (0.10)	0.001 (0.12)	-0.001 (0.08)	-0.002 (0.09)
ERP_{9596}	-0.000 (0.24)	-0.000 (0.65)	-0.000 (0.17)	-0.000 (0.26)	-0.000 (0.67)	-0.000 (0.20)	-0.000 (0.21)	-0.000 (0.65)	-0.000 (0.15)
Mills ratio	-0.428 (2.79)**	-0.259 (1.32)	0.011 (0.06)	-0.438 (2.86)**	-0.278 (1.44)	-0.026 (0.15)	-0.487 (3.12)**	-0.284 (1.46)	-0.035 (0.20)
Constant	-0.295 (0.68)	0.094 (0.20)	-0.292 (0.68)	-0.275 (0.63)	0.123 (0.26)	-0.247 (0.57)	-0.205 (0.47)	0.157 (0.33)	-0.197 (0.45)
R-squared	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02

Table A8.5 continued

Table A8.5 concluded

	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	0.010	-0.013	0.048	0.014	-0.009	0.050	0.012	-0.010	0.049
	(0.65)	(0.50)	(2.22)*	(0.90)	(0.36)	(2.33)*	(0.78)	(0.38)	(2.27)*
log(AGE_{9596})	-0.049	-0.011	0.013	-0.046	-0.009	0.014	-0.047	-0.009	0.013
	(2.82)**	(0.48)	(0.64)	(2.67)**	(0.39)	(0.71)	(2.71)**	(0.40)	(0.68)
FOR_{9596}	0.101	0.128	0.149	0.099	0.124	0.146	0.104	0.122	0.146
	(1.72)+	(1.92)+	(2.36)*	(1.70)+	(1.86)+	(2.31)*	(1.69)+	(1.83)+	(2.26)*
GOV_{9596}	0.033	-0.222	-0.189	0.030	-0.227	-0.192	0.030	-0.225	-0.191
	(0.45)	(1.78)+	(1.81)+	(0.41)	(1.82)+	(1.84)+	(0.41)	(1.81)+	(1.83)+
EXP_{9596}	0.022	0.091	0.058	0.023	0.092	0.058	0.036	0.085	0.054
	(0.43)	(1.52)	(1.00)	(0.46)	(1.53)	(1.01)	(0.61)	(1.13)	(0.80)
LEV_{9596}	-0.017	-0.021	-0.010	-0.000	-0.001	-0.003	0.000	-0.000	-0.002
	(3.16)**	(2.63)**	(0.69)	(0.07)	(0.62)	(0.90)	(0.22)	(0.04)	(0.69)
LEV_{9596}*FOR_{9596}				-0.002	0.009	0.008			
				(0.26)	(1.57)	(1.61)			
LEV_{9596}*log($SIZE_{9596}$)	0.006	0.005	0.003						
	(2.54)*	(2.54)*	(1.16)						
$IMDEP_{9596}$	-0.091	-0.023	0.012	-0.091	-0.023	0.012	-0.078	-0.031	0.007
	(1.99)*	(0.45)	(0.23)	(1.98)*	(0.43)	(0.24)	(1.67)+	(0.55)	(0.13)
$IMDEP_{9596}$*EXP_{9596}							-0.074	0.045	0.026
							(0.52)	(0.24)	(0.18)
$PCI2_{9596}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(2.14)*	(0.94)	(0.62)	(2.14)*	(0.98)	(0.66)	(2.07)*	(0.95)	(0.63)
$PSI2_{9596}$	-0.032	-0.029	-0.045	-0.033	-0.030	-0.046	-0.034	-0.029	-0.046
	(1.12)	(1.44)	(2.92)**	(1.15)	(1.47)	(2.95)**	(1.16)	(1.46)	(2.93)**
$CR4_{9596}$	0.611	0.441	0.915	0.572	0.405	0.889	0.580	0.412	0.902
	(1.22)	(0.65)	(1.39)	(1.15)	(0.60)	(1.35)	(1.16)	(0.61)	(1.37)
IMP_{9596}	0.001	-0.001	-0.002	0.001	-0.001	-0.001	0.001	-0.001	-0.001
	(0.09)	(0.09)	(0.09)	(0.07)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)
ERP_{9596}	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.27)	(0.69)	(0.21)	(0.28)	(0.67)	(0.19)	(0.28)	(0.67)	(0.19)
Mills ratio	-0.451	-0.277	-0.003	-0.417	-0.252	0.013	-0.427	-0.255	0.007
	(2.95)**	(1.42)	(0.02)	(2.74)**	(1.30)	(0.08)	(2.77)**	(1.29)	(0.04)
Constant	-0.264	0.125	-0.261	-0.290	0.105	-0.274	-0.281	0.105	-0.271
	(0.61)	(0.27)	(0.61)	(0.67)	(0.22)	(0.64)	(0.64)	(0.22)	(0.63)
R-squared	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02

Notes: 1) Robust t statistics in parentheses.

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Appendix 8.5 Complete regression results of Table 8.10

Dependent variable	$S_{i,t}$								
	EXP*MNC			EXP*LEV			EXP*SIZE		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
log($SIZE_{9596}$)	0.414 (17.61)**	0.442 (19.32)**	0.422 (19.59)**	0.415 (17.66)**	0.442 (19.34)**	0.421 (19.60)**	0.438 (16.42)**	0.459 (17.81)**	0.433 (18.14)**
log(AGE_{9596})	0.235 (14.20)**	0.213 (13.33)**	0.203 (13.11)**	0.235 (14.19)**	0.213 (13.33)**	0.203 (13.11)**	0.237 (14.29)**	0.214 (13.40)**	0.203 (13.16)**
FOR_{9596}	0.166 (1.15)	0.120 (0.85)	-0.003 (0.03)	0.097 (0.91)	0.081 (0.76)	0.030 (0.30)	0.110 (1.03)	0.089 (0.84)	0.035 (0.35)
GOV_{9596}	0.083 (0.52)	-0.170 (1.23)	-0.045 (0.34)	0.084 (0.52)	-0.168 (1.22)	-0.044 (0.33)	0.075 (0.47)	-0.173 (1.25)	-0.048 (0.36)
EXP_{9596}	0.037 (0.41)	0.000 (0.00)	-0.019 (0.23)	0.004 (0.04)	-0.023 (0.29)	-0.016 (0.21)	0.731 (2.22)*	0.497 (1.53)	0.369 (1.21)
EXP_{9596}*FOR_{9596}	-0.193 (0.78)	-0.115 (0.48)	0.079 (0.35)						
EXP_{9596}*log($SIZE_{9596}$)							-0.154 (2.21)*	-0.110 (1.60)	-0.080 (1.26)
EXP_{9596}*LEV_{9596}				0.091 (2.56)*	0.098 (2.72)**	0.087 (2.53)*			
LEV_{9596}	0.010 (0.77)	0.009 (0.86)	0.009 (1.08)	0.002 (0.38)	0.002 (0.41)	0.002 (0.46)	0.009 (0.78)	0.009 (0.86)	0.009 (1.08)
$IMDEP_{9596}$	0.038 (0.48)	0.060 (0.76)	0.033 (0.44)	0.041 (0.51)	0.062 (0.79)	0.035 (0.47)	0.033 (0.41)	0.056 (0.71)	0.031 (0.41)
$PCI2_{9596}$	0.000 (0.14)	-0.000 (0.37)	0.000 (0.14)	0.000 (0.14)	-0.000 (0.37)	0.000 (0.13)	0.000 (0.13)	-0.000 (0.38)	0.000 (0.13)
$PSI2_{9596}$	-0.059 (2.34)*	-0.049 (1.96)*	-0.046 (1.96)*	-0.059 (2.30)*	-0.048 (1.94)+	-0.047 (1.98)*	-0.060 (2.36)*	-0.049 (1.98)*	-0.047 (2.01)*
$CR4_{9596}$	-2.885 (3.83)**	-2.943 (3.81)**	-3.036 (4.05)**	-2.871 (3.81)**	-2.935 (3.80)**	-3.037 (4.05)**	-2.853 (3.79)**	-2.919 (3.78)**	-3.022 (4.02)**
IMP_{9596}	-0.020 (1.21)	-0.002 (0.11)	0.014 (1.05)	-0.020 (1.21)	-0.002 (0.11)	0.014 (1.05)	-0.019 (1.18)	-0.001 (0.10)	0.014 (1.06)
ERP_{9596}	-0.001 (1.97)*	-0.001 (1.54)	-0.000 (0.87)	-0.001 (1.95)+	-0.001 (1.53)	-0.000 (0.87)	-0.001 (1.96)*	-0.001 (1.52)	-0.000 (0.87)
Constant	-0.291 (0.52)	-0.452 (0.80)	-0.340 (0.61)	-0.304 (0.54)	-0.459 (0.81)	-0.335 (0.60)	-0.399 (0.71)	-0.528 (0.93)	-0.388 (0.69)
Pseudo R2	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

Appendix 8.5 continued

Appendix 8.5 Concluded

Dependent variable	$S_{i,t}$								
	LEV*SIZE			LEV*MNC			IMDEP*EXP		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
$\log(SIZE_{9596})$	0.417 (17.72)**	0.444 (19.40)**	0.423 (19.64)**	0.416 (17.69)**	0.443 (19.37)**	0.422 (19.62)**	0.414 (17.64)**	0.441 (19.31)**	0.421 (19.61)**
$\log(AGE_{9596})$	0.235 (14.19)**	0.213 (13.32)**	0.202 (13.10)**	0.235 (14.20)**	0.213 (13.34)**	0.203 (13.12)**	0.235 (14.19)**	0.213 (13.33)**	0.203 (13.11)**
FOR_{9596}	0.092 (0.86)	0.075 (0.71)	0.024 (0.25)	0.094 (0.87)	0.076 (0.72)	0.025 (0.26)	0.121 (1.11)	0.112 (1.03)	0.035 (0.35)
GOV_{9596}	0.083 (0.52)	-0.169 (1.23)	-0.046 (0.34)	0.082 (0.51)	-0.171 (1.24)	-0.047 (0.35)	0.081 (0.51)	-0.172 (1.25)	-0.046 (0.34)
EXP_{9596}	0.010 (0.12)	-0.015 (0.19)	-0.008 (0.11)	0.011 (0.13)	-0.014 (0.18)	-0.008 (0.10)	0.053 (0.59)	0.037 (0.43)	0.006 (0.07)
LEV_{9596}	0.057 (1.50)	0.056 (1.54)	0.048 (1.46)	0.005 (0.65)	0.005 (0.74)	0.005 (0.87)	0.009 (0.78)	0.009 (0.88)	0.009 (1.09)
$LEV_{9596}*FOR_{9596}$				0.052 (1.21)	0.051 (1.19)	0.044 (1.11)			
$LEV_{9596}*\log(SIZE_{9596})$	-0.009 (1.58)	-0.009 (1.61)	-0.007 (1.44)						
$IMDEP_{9596}$	0.038 (0.47)	0.059 (0.75)	0.033 (0.44)	0.039 (0.49)	0.061 (0.77)	0.034 (0.45)	0.075 (0.85)	0.107 (1.24)	0.047 (0.56)
$IMDEP_{9596}*EXP_{9596}$							-0.251 (1.10)	-0.321 (1.45)	-0.087 (0.41)
$PCI2_{9596}$	0.000 (0.15)	-0.000 (0.36)	0.000 (0.14)	0.000 (0.14)	-0.000 (0.38)	0.000 (0.13)	0.000 (0.15)	-0.000 (0.35)	0.000 (0.14)
$PSI2_{9596}$	-0.059 (2.31)*	-0.048 (1.95)+	-0.047 (1.98)*	-0.059 (2.29)*	-0.048 (1.93)+	-0.046 (1.97)*	-0.059 (2.34)*	-0.049 (1.99)*	-0.047 (1.99)*
$CR4_{9596}$	-2.874 (3.81)**	-2.936 (3.80)**	-3.037 (4.05)**	-2.881 (3.82)**	-2.943 (3.81)**	-3.043 (4.05)**	-2.879 (3.82)**	-2.944 (3.82)**	-3.039 (4.05)**
IMP_{9596}	-0.020 (1.21)	-0.002 (0.11)	0.014 (1.06)	-0.020 (1.21)	-0.002 (0.11)	0.014 (1.05)	-0.019 (1.21)	-0.002 (0.11)	0.014 (1.06)
ERP_{9596}	-0.001 (1.96)+	-0.001 (1.53)	-0.000 (0.88)	-0.001 (1.95)+	-0.001 (1.53)	-0.000 (0.87)	-0.001 (2.00)*	-0.001 (1.58)	-0.000 (0.89)
Constant	-0.309 (0.55)	-0.464 (0.82)	-0.340 (0.61)	-0.302 (0.54)	-0.457 (0.81)	-0.334 (0.60)	-0.295 (0.53)	-0.448 (0.79)	-0.333 (0.60)
Pseudo R2	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

Note: 1) Robust Z statistics in parentheses.
2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

Chapter 9

Firms' export supply response during the crisis

9.1 Introduction

The sharp exchange rate depreciation that was a feature of the 1997/98 Asian crisis was expected to have improved export performance of countries affected by the crisis. As reviewed, several studies (e.g. Dwor-Frecaut et al. 2000; Duttagupta and Spilimbergo 2004) have demonstrated that the evidence conflicts with this prediction. For Indonesia, export growth in terms of value contracted in 1998 by 4 per cent. Although explanations have been offered in the literature, those which focus on firm or plant behaviour are scarce. This chapter aims to fill the gap by examining the export supply response of plants in Indonesian manufacturing. In particular, two questions are asked. First, what is the picture of plants' export-supply response to the crisis? To date, very little is known about the response of firms in Indonesia and other crisis affected countries. Second, which characteristics determined this export-supply response of plants.

This chapter attempts to answer these questions and examines the export participation and adjustment in export propensity of manufacturing plants during the period 1997-2000. In addition, the chapter explores the general hypothesis concerning the impact of credit contraction on export supply response.

The chapter is organised as follows. Section 9.2 briefly reviews relevant literature. Section 9.3 presents the hypotheses related to the determinants of plant export supply response to the crisis. Section 9.4 describes the statistical framework, measurements of variables and discusses the data base. Section 9.5 presents the empirical analysis, while the last section summarises the main findings of the chapter.

9.2 Theoretical consideration and literature review

In the empirical literature, the neoclassical Heckscher-Ohlin model has long been adopted to explain the determinants of international trade across countries or industries. It was not until recently that research expanded to topics related to company export behaviour or performance, as a result of a greater accessibility to firm- or plant-level data.

One of the key findings from the empirical literature on micro export behaviour is that exporters are superior to non-exporters in some respects. For developed countries, Bernard et al. (1995) and Bernard and Jensen (1999), for example, documented that exporters in US manufacturing are larger, more productive, more capital intensive, pay higher wages, and employ more skilled workers. A similar finding was observed by Aw and Hwang (1995) and Berry (1992) for developing countries. For Indonesian manufacturing, Sjoholm and Takii (2003) observed that exporting plants are larger and more productive. They found that labour productivity of these plants was about twice as high as non-exporting plants and this difference seems to have increased over time during the 1990s.

The finding is attributed to the difference in productivity between exporters and non-exporters. However, the exact mechanism linking exporting and productivity is not clear. Two explanations have been put forward. The first, which is commonly referred to as the 'self-selection' hypothesis, argues that only the most productive firms are able to survive in the highly competitive export markets. The hypothesis is based on the presumption that there are additional costs involved in participating in export markets. These costs, which usually involve high fixed costs, include transport costs and expenses related to establishing distributional channels and production costs in adapting products for foreign tastes (Bernard and Jensen 1999). The alternative explanation argues that there is a learning effect from participating in exporting activities which will result in productivity improvement. One example is that exporters are often argued to be able to gain access to technical expertise, including product design and method, from their foreign buyers (Aw et al. 2000, p.67). This explanation is often termed as a 'learning-by-exporting' hypothesis. According to Aw et al., this kind of explanation might be particularly relevant for East Asian exporters.

While there has not been a consensus, some empirical studies (e.g. Bernard and Jensen 1999; Clerides et al. 1998; Aw et al. 2000; Hallward-Driemeier et al. 2002) give some support for the self-selection hypothesis. Bernard and Jensen found that exporters in US manufacturing are more efficient, larger and grow faster several years before they become exporters. Aw et al. found for manufacturing industry in Taiwan and Korea that the average productivity of continuing exporters and new entrants as exporters are significantly higher than exiting exporters and non-exporters. Nevertheless, for several industries, they were not able to strongly conclude there was a wide gap in productivity difference between exporters and non-exporters. Using firm-level data of manufacturing industries in some South East Asian countries, Hallward-Driemeier et al. (2002, p.25) observed a substantial productivity difference between domestic firms that were established as exporters and domestic firms that were not. They interpret this finding as indicating that firms participating in export markets make a conscious decision to operate differently from ones that focus on the domestic market. Supporting this interpretation, they show that domestic exporters indeed bear a resemblance to foreign exporters. In particular, they are more capital intensive and use more equipment of recent vintage than domestic non-exporters.

The presumption that exporting requires additional costs, which can naturally be thought of as sunk costs (Bernard and Wagner 1998), has an important implication. That is, it produces persistence in export participation. Once a firm decides to service an export market in a period of time, it tends to stay an exporter in the next period of time. To illustrate this, a variant model of decision to export with sunk entry-costs, first developed by Roberts and Tybout (1997) is presented below, borrowing from Campa (2004).[1] The expected profits of a rational, profit-maximising firm i at time t, $\hat{\pi}_{it}$, are given by

$$\hat{\pi}_{it} = Y_{it}\left[\pi_{it}\left(X_t, Z_t\right)\right] - N_{it} \bullet (1 - Y_{it-1}) \tag{9.1}$$

where π_{it} is gross profit from exporting, which is not adjusted for entry costs and depends on X_t and Z_{it}, which denote exogenous factors that affect profitability (e.g. exchange rate) and firm-specific factors, respectively. N_{it} is the entry cost faced by the firm and Y_{it} is an indicator variable that takes the value of 1 if the firm exports in t and 0 otherwise. The value of $\hat{\pi}_{it}$ depends on whether the firm exported or not in the previous year (i.e. whether $Y_{it-1} = 1$ or $Y_{it-1} = 0$). If the firm exported in the previous year, $\hat{\pi}_{it} = \pi_{it}$, but if the firm did not export in the previous year, it must pay entry cost, $\hat{\pi}_{it} = \pi_{it} - N_{it}$.[2]

[1] This model is similar to that of Bernard and Wagner (1998) regarding the specification of entry costs.
[2] In Roberts and Tybout (1997), the entry costs are allowed to be the function of exporting history.

The firm is assumed to plan the sequence of its export participation to maximise expected current and discounted future profits net of entry costs,

$$V_{it}(\Omega_{it}) = \max E_t\left(\sum_{s=t}^{\infty} \delta^{s-t}\hat{\pi} \mid (\Omega_{it})\right) \tag{9.2}$$

where E_t is an expectation operator conditioned on the set of information at time t (Ω_{it}) and δ is a time discount rate. Firm i chooses the current value of Y_{it} that satisfies the Bellman's equation :

$$V_{it}(\Omega_{it}) = \max\left(\hat{\pi}_{it} + \delta E_t\left[V_{it+1}(\Omega_{it+1}) \mid Y_{it}\right]\right) \tag{9.3}$$

Solving the first-order condition of 9.3, firm i will decide to export when

$$\begin{aligned}\pi_{it}\left(X_t, Z_t\right) + \delta\left[E_t\left[V_{it+1} + 1(\Omega_{it+1}) \mid Y_{it} = 1\right]\right] - E_t\left[V_{it+1} + 1(\Omega_{it+1}) \mid Y_{it} = 0\right] \\ \geq N_{it} \bullet (1 - Y_{it-1})\end{aligned} \tag{9.4}$$

From equation 9.4, it is clear how the sunk entry-costs produce persistence in export participation. Positive sunk entry costs (i.e. $N_{it} > 0$) implies that the decision to export is dependent on time. This can clearly be seen by supposing there are no sunk entry-costs (i.e. $N_{it} = 0$) which collapses equation 9.4 to $\pi_{it}\left(X_t, Z_t\right) \geq 0$ and leaves the decision to export as a purely static process (i.e. independent of time).

The role of sunk costs in affecting a firm's decision to export has been another important topic in the empirical literature. While there has not been much study on this topic, a few studies do agree that sunk costs are a large and significant source of persistence in exporting. For example, Roberts and Tybout (1997) found that exporting experience in the previous year had a strong and positive effect in determining export participation in the current year for plants in Colombian manufacturing. Similar findings can also be observed in Campa (2004) and Bernard and Jensen (2004) for Spain and US manufacturing plants, respectively.

If entering foreign markets is costly, there might be localised spillovers associated with exporting by one firm that reduces the cost of foreign market access for nearby firms. This idea was put forward by Aitken et al. (1997). In particular, they test the hypotheses that any exporting activity, and especially exporting activities by multinationals, generates export spillovers. The first hypothesis is based on the argument that the geographic concentration of exporters may make it feasible to construct facilitates that are able to support export activities. The second hypothesis is based on the presumption that foreign firms are the natural conduit for information about foreign markets, export marketing channels and technology. The extent to which foreign firms provide this information may enhance the likelihood of domestic firms becoming exporters. Using plant-level data for Mexican manufacturing for 1986-1990 they found robust results supporting the second hypothesis. The probability of a domestic plant exporting is positively correlated with the proximity of multinationals. As for the first hypothesis, they found that the probability of exporting is positively correlated with the local concentration of overall export activity. However, this finding is not robust to changes in sample size. Their results suggest the lack of robustness is related to large differences in specific industry characteristics. The positive export spillovers effect from multinationals was confirmed by Greenaway et al. (2004) using a panel of firms in the UK. They found that multinationals not only increase the decision of domestic firms to export, but also export intensity.

The review so far considers the general literature on micro export behaviour performance. The rest of this section reviews the literature to gain some knowledge on the export supply response to a crisis. A substantial part of the review was undertaken in Chapter 4 (Section 4.3.4). Nonetheless, several points were not addressed and will now be discussed, after firstly summarising the review done in Section 4.3.4.

The main point from the review is that there was puzzling evidence on the export response of the countries affected by the Asian crisis of 1997/98. The aggregate export response was not as expected, given the significant increase in competitiveness due to the sharp exchange rate depreciation. Three explanations for this puzzle were put forward in the literature. The first is the region wide export shock in the years immediately before the crisis (1995-96). The shock was attributed to weakened demand, as many Asian countries specialised in trading amongst themselves, and depreciation of the Japanese yen against the US dollar during the period, as many Asian currencies were effectively being pegged to the US dollar. The second explanation is credit contraction to the private sector during the crisis, i.e., the so-called credit crunch hypothesis. However, the empirical evidence does not lend strong support to this explanation. Another explanation for the evidence is that many exporters were actually foreign firms and therefore likely to have been supported by parent companies and less likely to have experienced liquidity constraint. The third explanation emphasises the effect of competitive depreciation; for this there is some supporting evidence. Finally, and specifically for Indonesia, the sluggish export performance can be attributed to structural problems. As mentioned, these included the cancellation of export orders, lack of container supply and rejection of Indonesia's letter of credit, owing to the political uncertainties.

Empirical studies examining how firms or exporters responded to an economic crisis have been sparse, but two are worth reviewing – Blomstrom and Lipsey (1993) and Lipsey (2001). Both examine the export response of US affiliates in some Latin America countries to the 1980's debt crisis. Lipsey (2001) extended the analysis in the context of the Asian 1997/98 crisis.

The studies focus on the role of foreign ownership as an important determinant in a successful response to the crises. They argue that it is easier for multinationals to redirect sales from domestic to export markets (Blomstrom and Lipsey 1993, p.109). The capacity to switch from domestic to external markets, being well connected to the latter through global distribution channels and better knowledge than local firms in terms of international marketing skills, are the reasons behind the argument.

Blomstrom and Lipsey showed that both export growth and the propensity of US affiliates in some Latin American countries increased dramatically during the 1980's crisis. However, they noted that these increases could partly be attributed to the decrease in domestic sales rather than an increase in production. Any increase from production is suggested to have happened over a longer time period after the crisis.

Lipsey (2001) shows that exports of US and Japanese affiliates increased at a higher rate than the rate of the total host countries' export in 1997 and 1998, resulting in an increase in the affiliates' share in the countries' exports.[3] Providing more evidence on sales redirection, Lipsey shows the ratio of exports to total sales of US manufacturing affiliates in East Asia increased significantly in 1998. For the crisis-affected countries, the largest change is

[3] The figure for Japanese manufacturing was limited only until 1997.

observed for Indonesia and Malaysia. Between 1997 and 1998, the ratio increased from 17 to 32 per cent for Indonesia and from 68 to 85 per cent for Malaysia.

9.3 Hypotheses

This section identifies and presents the hypotheses related to the determinants of the export-supply response of firms in Indonesian manufacturing during the crisis period, drawing on the discussion of the previous section and the general literature on Indonesian manufacturing. The crisis period is defined as 1997-2000.

Exporting history

Exporting history is hypothesised to positively increase the probability to export in the crisis period. Models of probability to export with sunk-export costs postulate that a current decision to export affects future decision or, in other words, there is a "persistence" in export participation. Export history is captured by introducing a dummy variable for exporting status during the period 1995-96 (EP_{9596}).

Plant level labour productivity and factor intensity

Fiercer competition in export markets means firms need to be efficient in order to survive, i.e., "self-selection hypothesis". This suggests a positive relationship between plant level labour productivity (LP) and export supply response. Plant level factor intensity, capital intensity (PCI) and skill intensity (PSI), are also expected to be positively related to export response. The argument is that plants using advanced technology and employing skilled workers are able to be more cost-efficient. Despite this, a negative relationship might be observed for skill intensity. Along with high inflation, higher labour quality implies higher wage expenses which could have mitigated the increase in competitiveness unless labour was willing to take lower real wages and salary during the crisis. The findings from Chapter 7, 8 and previous studies that some plants in the manufacturing industry hoarded labour supports this suggestion.

In addition to reflecting differences in costs, plant level factor intensity is also able to capture the difference in product quality. Product quality is another important factor as it is often asserted that the foreign market requires a more sophisticated quality of goods than domestic markets.

Firm Size

Size of firm ($SIZE$) is expected to affect the export-supply response, although the direction of the relationship is unclear. For a given industry, only larger firms have a higher survival chance in competitive foreign markets if economies of scale exist (Bonacorsi 1992). This argument suggests a positive relationship between $SIZE$ and the export-supply response. In addition, it is often asserted that the more sophisticated management and better resources of large firms allow them to be more responsive than small firms in responding to any increase in export demand (Calof 1994). Despite this, a negative relationship may also occur. This is because there are some channels that allow some small and medium firms in Indonesian manufacturing to successfully perform in export markets, including sub-contracting schemes, clustering, trading in foreign market niches and access to informal sources of financing (Berry et al. 2001; Sandee and van Diermen 2004).

Firm Age

The effect of firm age (AGE) on the export-supply response is ambiguous. On the one hand, older firms tend to be more experienced. Related to this, the theory on firm learning (e.g. Jovanovic's (1982) selection model) suggests older firms are likely to be more productive and larger. On the other hand, adjustment is also likely to be more difficult for older firms. The learning theory also suggests younger firms have more dynamism. Apart from this, a positive relationship might also be observed simply because younger firms in Indonesia tend to be export more oriented than older ones, owing to the liberalized export oriented trade and investment policies from the mid 1980s (Ramstetter 1999).

Foreign ownership

Foreign ownership (FOR) is expected to be positively related to the export-supply response. As argued by Blomstrom and Lipsey (1993), it is easier for multinationals to redirect sales from domestic and foreign markets. The expected difference, however, may depend on the extent of the foreign share in MNEs. It is often argued that parent companies may not completely transfer the full extent of specific assets if the ownership share of the parent companies is small (Ramstetter 1999). To take this argument into account, an interaction variable $DFOR*FOR$ is introduced.[4] It is hypothesised that the extent to which multinationals responded better is higher for those multinationals with a higher foreign share.

[4] See Chapter 7 for more details on the definition of *FOR*.

Share of imported input

The extent to which exchange rate positively affects the profitability of exporting firms depends on the share of imported input they use in production. The positive impact is only minimal if production involves a large share of imported input, since higher expenditure on imported input counteracts the relative lower labour costs (Forbes 2002a). Accordingly, the share of imported input to total input ($IMDEP$) is expected to be negatively related to export-supply response.

Export spillovers

This study considers two forms of export spillover: industry-specific and region-specific. The latter is introduced because exporters are usually concentrated in a region with export-supporting facilities. Guided by the theory reviewed in the previous section, both forms of spillover are expected to positively affect the export-supply response. Two variable specifications are considered for each form of export-spillover: on the basis of the number of exporting plants ($INEXP_j$ and $RNEXP_k$), and exported output ($IEXP_j$ and $REXP_k$). j and k denote industry and region, respectively.

Industry competitiveness prior to the crisis

If export expansion can be thought of as an activity introducing a new product to a market, industry competitiveness should be important in determining export response during the crisis. The natural choice to proxy this effect would be some variables reflecting an industry's factor intensity. Two variable specifications are considered. First, it is specified based on some categorisation of industrial sectors by their factor intensity. Included in this specification are dummy variables for resource intensive sectors (DRI), labour intensive sectors (DLI) and capital intensive sectors (DCI). The definition of these variables has been presented in Chapter 7. The second specification is based on some continuous-variable measures. These are industry resource intensity (IRI), industry capital intensity (ICI) and industry skilled-labour intensity (ISI). The second specification was introduced mainly to reflect industry in Indonesian manufacturing that relate to export.[5]

According to the Heckscher-Ohlin model, plants in resource- and labour-intensive industries should have responded better in terms of export than plants in capital-intensive industries. The coefficients of DRI and DLI are expected to be positive in the regressions, with DCI

[5] See the discussion in Chapter 2.

as the base dummy variable. As for the second specification, *IRI* is expected to be positively related to the export-supply response while *ICI* and *ISI* are expected to be negatively related.

The factor intensity variables, although useful, may not perfectly capture the industry competitiveness effect. This is because there is a large variation over time before the crisis in the trade competitiveness within groups of industries classified by their factor intensity. The variation is illustrated in Table 9.1 which gives the dynamics of a Revealed Comparative Advantage (RCA) index in Indonesian manufacturing over the period 1985-1996. First, some sectors in these industries experienced a decline in comparative advantage over the last few years prior to the crisis. Included are a few sectors which propelled the export boom in the 1980s. For example, the RCA index for wood and wood products (ISIC 331) and wearing apparel (ISIC 322) declined during the period 1989-1996. For this period, exports of these industries alone accounted for about 30 percent of Indonesia's manufacturing export. Second, it was also revealed that some other resource- and labour- intensive sectors had actually moved up to the class of high RCA sectors during the same period.

To deal with this dynamism, a dummy variable indicating industry competitiveness before the crisis (*COMP*) was introduced interchangeably with the factor intensity variables. The hypothesis is that plants in competitive industries before the crisis are expected to have performed better than plants in other industries.

Other determinants

The inclusion of the determinants outlined above does not necessarily mean it has incorporated all factors deemed important for explaining the export supply response of firms in Indonesian manufacturing during the crisis period. Other determinants may significantly affect the response. The first group of these determinants are those related to external factors. As suggested by the literature review, some of the most important are the sharp exchange rate depreciation, the downward cycle in demand of some of Indonesia's major export products and the trade financing problem during the crisis. In principle these factors should have affected all Indonesian firms equally, although some may have been affected differently across industries. In the regressions, these factors are accounted for by including dummy variables for years and industries.

The other group of determinants is the group of unobserved firm-level characteristics. Included in these characteristics are those such as managerial capability, product attributes and special access to production input. Specification issues related to these characteristics are discussed in the next section.

Table 9.1 Dynamics in Revealed Comparative Advantage (RCA) index of Indonesian manufacturing, 1985-1996

a. The 1985-1989 period

RCA 1985	ISIC	Industry	Change in RCA, 1985-89
High	331	Wood and wood products	(+)
	322	Wearing apparel	(+)
	321	Textiles	(+)
	314	Tobacco	(+)
	353	Petroleum refineries	(-)
	372	Nonferrous metal	(-)
	311	Food	(-)
Low	351	Industrial chemical	(+)
	371	Iron and steel	(+)
	355	Rubber products	(+)
	381	Fabricated metal product	(+)
	341	Paper and paper product	(+)
	390	Other manufacturing	(+)
	356	Plastic products	(+)
	323	Leather and leather products	(+)
	362	Glass and glass products	(+)
	369	Non-metallic mineral products	(+)
	384	Transport equipment	(+)
	332	Furniture	(+)
	385	Profesional and scientific equipment	(+)
	361	Porcelain	(+)
	342	Printing and publishing	(+)
	382	Non-electrical machinery	(+)
	324	Footwear	(+)
	313	Beverages	(+)
	383	Electrical machinery	(-)
	352	Other chemical products	(-)
	312	Other food products	(-)

Table 9.1 continued

Table 9.1 (concluded)

b. The 1989-1996 period

RCA 1989	ISIC	Industry	Change in RCA, 1989-1996
High	321	Textiles	(+)
	311	Food	(+)
	355	Rubber products	(+)
	356	Plastic products	(+)
	390	Other manufacturing	(+)
	332	Furniture	(+)
	361	Porcelain	(+)
	324	Footwear	(+)
	331	Wood and wood products	(-)
	322	Wearing apparel	(-)
	353	Petroleum refineries	(-)
	372	Nonferrous metal	(-)
	314	Tobacco	(-)
Low	383	Electrical machinery	(+)
	351	Industrial chemical	(+)
	381	Fabricated metal product	(+)
	341	Paper and paper product	(+)
	382	Non-electrical machinery	(+)
	384	Transport equipment	(+)
	385	Profesional and scientific equipment	(+)
	342	Printing and publishing	(+)
	371	Iron and steel products	(-)
	352	Other chemical products	(-)
	362	Glass and glass products	(-)
	312	Other food products	(-)
	323	Leather products	(-)
	369	Other non-metallic mineral products	(-)
	313	Beverages	(-)

Source: Aswicahyono and Pangestu (2000)

9.4 Statistical framework, measurements of variables and data

9.4.1 Statistical framework

The determinants of export supply response to the crisis are examined by way of some statistical regressions. Two dependent variables are considered to represent the response: (1) change in export participation, and (2) change in export propensity. The choice of the variables is motivated by the empirical literature, where export supply response is often examined by evaluating the change in some measures of export performance between two points of time. The measures used most often are the value or volume of exports and the propensity to export. Calculating these measures is straightforward at the aggregate level, but not at the firm level. This is because aggregate change in export is a result from two different, but related, firm behaviours. First, existing exporters can increase or decrease their exported output. They may increase by redirecting output to foreign markets or by expanding exports. Included in this mechanism are exporters that switch from exporting to non-exporting. The second behaviour is where non-exporters that have been domestically oriented switch to participate in foreign markets. The second mechanism can also be achieved by new firms entering the industry.

The two points of time are the crisis (1997-2000) and the pre-crisis (1995-96) periods. There are four points of observation for the crisis period, i.e., 1997, …, 2000, since the data base are enumerated annually. As for the pre-crisis period, the point of observation is considered to be one, and is defined slightly differently for the export participation and propensity variables. The former is defined as the exporting status in 1995 or 1996, while the latter is defined as the average of the export propensity in 1995 and 1996. The use of 'or' in the pre-crisis export participation definition is motivated by the empirical regularity that exporting is not a once-and-forever phenomenon. Overall, the change in the dependent variables is defined broadly as of the change in export participation or export propensity between the crisis and pre-crisis periods.

The empirical models in their general form are given as the following:

$$EP_{it} = \alpha_0 + \alpha_1 ' X_i + \alpha_2 ' Y_j + \varepsilon_{it} \tag{9.5}$$

$$\frac{EXP_{i,t} - EXP_{i,9596}}{EXP_{i,9596}} \times 100 = \%\Delta EXP_{it} = \beta_0 + \beta_1 ' X_i + \beta_2 ' Y_j + \mu_{it} \tag{9.6}$$

where 9.5 and 9.6 are export participation and export propensity adjustment equations, respectively. i represent plant i, t represents the crisis period (i.e. t=1997, ..., 2000). EP_{it} is a binary variable which takes the value of 1 if the plant was exporting in the crisis period and 0 otherwise. EXP_{it} is a plant's export intensity and is defined as the ratio of exports to total output.[6] X_i, and Y_j are sets of explanatory variables capturing the pre-crisis plant and industry characteristics, respectively. Unless otherwise stated, all explanatory variables are defined as their average value between 1995 and 1996, in recognition that 1996 may not be a 'normal' year to represent the pre-crisis period. Year, industry, and regional dummies are included to control for differences across years, industries and region, respectively. The year dummy variables should capture the other determinants which exogenously affect the dependent variables.

While useful, the models are unable to take into account some unobserved determinants. Essentially, this is the same as the limitation in the models of the previous chapter. As explained in that chapter there is computational limitation to proceeding with the ideal approach (i.e. dummy variable approach to control for fixed effect). This chapter follows the same approach as the previous one, which is to take no action. Accordingly, one needs to take into account that the estimates might be biased.

Equation 9.5 was estimated within the framework of a binary choice model (i.e. probit or logit), instead of a linear probability model (LPM). This is mainly because the predicted probability derived from LPM may lie outside the 0-1 region, which is clearly not reasonable in practice. Despite this, a binary response model also has a number of shortcomings. One important one is that the potential for bias arising from neglected heterogeneity (i.e. omitted variables) is larger in a binary choice model than in a linear model. Nevertheless, Wooldridge (2002) points out that estimating a binary response model by a binary choice model still gives reliable estimates, particularly if the estimation purpose is to obtain the direction of the effect of explanatory variables.

The estimations use pooled cross-section data drawn from the data base of continuously operating plants during the period 1997-2000. The sample is balanced and therefore different to the one used in the previous chapter (i.e. unbalanced pooled-cross-section). The balanced

[6] See Chapter 7 for further details on the definition of EXP_{it}.

form was used because plant survival during the crisis period, the subject for which an unbalanced panel is needed, was addressed in the previous chapter.

To facilitate hypothesis testing and organise the empirical analysis, estimations were done in three steps. In the first step, equation 9.5 was estimated for the full sample, which consists of exporting and non-exporting plants in the pre-crisis period. The emphasis here is on export participation response and the hypothesis testing on exporting history. In the second step, equation 9.5 was estimated for two different samples. The first includes only exporting plants while the second includes only non-exporting plants. For the purpose of discussion, these samples are labelled exporting and non-exporting sample, respectively. Finally in the third step, equation 9.6 was estimated only for the exporting sample. The emphasis here is on export propensity response.

Two reasons motivate the estimations in the second step. First, the estimation is necessary because the assumption imposed by the estimation for the full sample, of no fundamental difference between exporters and non-exporters, is too strong. As reviewed, the empirical literature has shown that they are indeed different. Second, the crisis provides a suitable experiment to learn more about switching behaviour from non-exporting to exporting.

For the estimation in the first step, the empirical model can be rewritten as

$$EP_{it} = \alpha_0 + \alpha_1 EP_{9596} + \alpha_2 ' X_i + \alpha_3 ' Y_j + \varepsilon_{it} \qquad (9.7)$$

There is a potential endogeneity problem in estimating equation 9.7, with exporting history (EP_{9596}) being the endogenous variable. EP_{9596} is likely endogenous because there is strong persistence in the variable correlates with ε_{it}. As was reviewed, previous studies (e.g. Roberts and Tybout 1997; Campa 2004) found a very strong effect from the previous years' exporting status on the current decision to export. To correct for this problem, the instrumental variable approach was adopted.

In this situation, two alternative estimation methods can be used: joint estimation and two-step procedure. The two-step procedure is more attractive because of its computational advantage. The equation for endogenous variable (as a function of the instrumental variables) is not estimated jointly with the equation of interest (i.e. equation 9.7), which computationally can be very complicated. Mimicking the standard 2SLS approach, the two-step procedure firstly estimates the endogenous variable, by LPM, before estimating equation 9.7 by the binary choice model. Despite the advantage, the two-step procedure often gives less consistent and efficient estimates than maximum likelihood estimation (MLE) estimates (Wooldridge 2002, p.476). For this reason, the equation was estimated using the joint estimation method.

It is important to note the assumption of strong persistence in equation 9.7 might not be relevant for the later years of the crisis period (i.e. 1998-2000). In other words, a plant decision to participate in export during, for example, 1999-2000 would not necessarily have been affected by the plant's exporting history in 1995 or 1996, as modelled in equation 9.7. The reason being that the impact of the previous exporting experience can depreciate once exporters cease participating in export markets. For example, Roberts and Tybout (1997) found for Colombian manufacturing that the previous year's exporting status strongly and positively affected the current year's export participation, but the exporting status of two or three years earlier only had small a positive affect on current export participation.

It can nevertheless be argued that the assumption is still relevant, at least in the context of this study. This is because the crisis period was definitely not a 'normal' period, in contrast to the Roberts and Tybout finding that should be more appropriately applied in the context of a normal business cycle. With such a deep contraction in 1998, it is possible to observe that an exporter discontinued exporting during the peak of the crisis but resumed exporting during the early recovery period. Thus, being out of the export market in 1998 or 1999 does not necessarily mean the plant would permanently be in a non-exporting state.

An important statistical issue regarding estimation of equation 9.6 is "sample censoring". The dependent variables, $\%\Delta EXP_{it}$, can only be calculated for pairs of plants that remained as exporters in 1995 or 1996 and in any year between 1997 and 2000. About 50 percent of exporting plants in the period 1995-96 were no longer recorded as exporters in any year between 1997 and 2000 except for 1998. Therefore the sample is truncated and estimating equation 9.6 on the selected sample may lead to biased estimates. As with the estimations in the previous chapter, Heckman's (1976) two-step estimation method was used to correct this problem. In the first step, equation 9.5 was estimated using the probit model and the inverse Mills ratio was computed for every observation. In the second step, equation 9.6 was estimated on the selected sample, adding the computed inverse Mills ratio as another explanatory variable.

9.4.2 Data and measurements of variables

Data for the estimation were drawn from the data base described in Chapter 5. Plants recorded in 1996 but not recorded in any year between 1997 and 2000 were excluded. Retaining these plants would complicate an analysis required to model firm survival during the crisis period. The subject of firm survival was addressed in the previous chapter. Meanwhile, new recorded plants during the period 1997-2000 were retained, because export response may involve a group of new firms. The sample consists of 7,962 plants, 2,316 of which are exporting plants in 1995-96.

Many of the independent variables have been defined in the previous chapter. Therefore, the definition of independent variables presented here covers only those not previously discussed.

As mentioned, this chapter considers two specifications for each of the two export spillovers (i.e. industry- and region-specific): on the basis of number of plants ($INEXP_j$ and $RNEXP_k$) and industry export intensity ($IEXP_j$ and $REXP_k$). $INEXP_j$ and $RNEXP_k$ are defined as the ratio of exporting to total plants of industry j and region k, respectively. $IEXP_j$ and $REXP_k$ are defined as the ratio of exports to total output of industry j and region k, respectively. Output is defined in terms of value added, j is defined at the four digit ISIC level and k at the district (*kabupaten*) level.[7]

Following Koo and Martin (1984), industry resource intensity (IRI) is measured by the ratio of direct and indirect purchases of input from agriculture, fisheries, forestry and mining industries to the total value of purchased input. This study uses the 1995 Input-Output Table.

In principal, the definition of industry capital and skilled-labour intensity (ICI and ISI) follows that of plant capital and skilled-labour intensity. The only difference is in the level of aggregation. ICI and ISI are defined at industry level while PCI and PSI are defined at

[7] As was noted in Chapter 7, the definition of industry j also applies to other industry level variables used in this thesis.

plant level. The industry level is defined at the four digit ISIC level. As in the plant level variables, ICI and ISI are defined in two ways. For ICI in industry j, these are

$$ICI1_j = \frac{(non-wage\ value\ added)_j}{(total\ number\ of\ employee)_j}$$

$$= \frac{(value\ of\ output)_j - (inputs)_j - (wages\ and\ salary)_j}{(total\ number\ of\ employee)_j} \text{ and}$$

$$ICI2_j = \frac{(energy\ costs)_j}{(total\ numbers\ of\ production\ employee)_j}$$

$$= \frac{(fuel\ costs)_j + (electricity\ cost)_j}{(total\ numbers\ of\ production\ employee)_j}$$

while for ISI in industry j,

$$ISI1_j = \frac{(total\ expenditure\ on\ wages\ and\ salary)_j}{(total\ numbers\ of\ employee)_j} \text{ and}$$

$$ISI2_j = \frac{(total\ numbers\ of\ non\text{-}production\ employee)_j}{(total\ numbers\ of\ production\ employee)_j}$$

$COMP_{j,89}$ is defined to be equal to 1 if the corresponding three-digit ISIC industry of an industry j is classified with a high RCA index in 1989 and zero otherwise. This study uses the RCA index computed by Aswicahyono and Pangestu (2000), presented in Table 9.1. In the table, an industry with a high RCA index is defined as an industry with a RCA index greater than unity, implying Indonesia has a comparative advantage in the industry product.

The complete list of variables included in the models is given in Table 9.2, together with their description and expected signs.

Table 9.2 Variable description and the expected signs

Variable	Description	Expected sign
$EP_{i,9596}$	Dummy variable for exporting history of plant i during 1995-96	+
$LP_{i,9596}$	Labour productivity of plant i, average 1995-96	+
$CI_{i,9596}$	Capital intensity of plant i, average 1995-96	+
$SI_{i,9596}$	Skill intensity of plant i, average 1995-96	+/-
$SIZE_{i,9596}$	Size of plant i, average 1995-96	+/-
$AGE_{i,96}$	Age of plant i in 1996	+/-
$DFOR_{i,9596}$	Dummy variable for MNE status of plant i in 1996	+
$DFOR_{i,9596}*FOR_{i,9596}$	Interaction variable between DMNE9596 and FOR9596. FOR_{9596} is the share of foreign ownership in plant i, average 1995-96	+
$IMPORT_{i,9596}$	Share of imported input for production in plant i, average 1995-96	-
$INEXP_{j,9596}$	Relative number of exporting firms in industry j, average 1995-96	+
$IEXP_{j,9596}$	Export intensity of industry j, average 1995-96	+
$RNEXP_{k,9596}$	Relative number of exporting firms in region k, average 1995-96	+
$REXP_{k,9596}$	Export intensity of region k, average 1995-96	+
$IRI_{j,95}$	Resource intensity of industry j in 1995	+
$ICI1_{j,9596}$	Capital intensity of industry j, average 1995-96	-
$ISI2_{j,9596}$	Skill intensity of industry j, average 1995-96	-
$DRI_{j,9596}$	Dummy variable for resource intensive industry in 1995 and 1996	+
$DLI_{j,9596}$	Dummy variable for labour intensive industry in 1995 and 1996	+
$COMP_{j,89}$	Dummy variable for competitive industry in 1989-96	+

9.5 Empirical analysis

9.5.1 The plant export supply response to the crisis: a descriptive analysis

The empirical analysis starts with a descriptive analysis to gauge the picture of the export-supply response of firms in Indonesian manufacturing between 1997 and 2000. To assist the discussion, some descriptive tables are presented in Tables 9.3 to 9.13. Unless otherwise stated, they have been computed by the author from the data base.

Before analysing the response at plant level, it is useful to get a perspective on the response at the aggregate level. This is given in Table 9.3.[8] Focusing first on industry export intensity and participation rate, the table does not seem to show any positive effect for the response. In 2000, both export intensity and participation rates were about the same as the pre-crisis rates. One possible explanation is that it simply reflects a 'time-lag' effect where the structure of firm and industry were adjusted. Thus, a substantial increase in intensity and participation

[8] In this table, the export participation rate is proxied by the ratio of exporting plants over total plants in the industry for the corresponding year. The pre-crisis rates are defined by the average of the rates over the period 1993-96.

rate – if any – should be observed in more recent years. Unfortunately this study does not cover any of these years. Despite this, the finding shares a similarity to the pattern of Latin America's debt crisis experience in the mid 1980s. Blomstrom and Lipsey (1993) pointed out that the increase in export propensities of US affiliates in the countries only began to come from rising production – rather than from a reduction in domestic sales – in a longer time period after the crisis. Turning to the annual growth rates of export intensity and export participation rate, the extent of recovery is very clear. First, export intensity and participation rate recovered almost immediately in 1999 after severely contracting in 1998. The growth rates were about 106 and 487 per cent, respectively. The magnitude of the growth rates seems to suggest a kind of 'catching-up'. This continued in 2000, albeit at a much slower rate and the growth rates in this year were significantly higher than the pre-crisis rates. This finding is consistent with a region wide recovery in 2000, since intra-regional exports accounted for a large share of the region's total exports (World Bank 2000).

Table 9.3 Summary of Indonesian manufacturing export, 1993-2000

	1993-96	1997	1998	1999	2000
Nominal value of export[1] (million \$, indexed, 1993=100)	117.37	124.9	116.7	140.5	186.4
Annual growth (%)	*0.12*	*-8.4*	*-6.5*	*20.4*	*32.7*
Export intensity[2]	0.25	0.26	0.09	0.19	0.24
Annual growth (%)	*0.12*	*-2.0*	*-63.0*	*105.6*	*22.8*
Export participation rate[3]	0.18	0.14	0.02	0.14	0.17
Annual growth (%)	*0.02*	*-28.3*	*-83.0*	*486.8*	*21.2*
Real Effective Exchange Rate (REER) index[4]	115.24	114.4	57.2	81.8	76.0

Notes:

1. Source: BPS, Trade statistics, 1993-2000.
2. The ratio of exports to total output.
3. The ratio of exporting to total plants.
4. Source: Bank Indonesia, Indonesian Financial Statistics, various issues.

Table 9.3 also indicates the deep export contraction in 1998 originated from a large number of exporters discontinuing exports. The export participation rate in the year was virtually zero and can perhaps be attributed to the large cancellation of export orders due to the political and social turmoil.

The first micro-level fact is given in Table 9.4, which puts together transition matrices that describe the movement of the exporting status of continuously operating plants between the pre-crisis and crisis period. The matrices strongly indicate a persistence in the change of export participation. About 95 per cent of total non-exporting plants in the pre-crisis period stayed as they were in 1999 and 2000. The remaining 5 per cent are plants that were able to switch to exporting in 1999 and 2000. This picture is also shown by the firm-level survey conducted by the World Bank (Dwor-Frecaut et al. 2000, p.148). In particular, they found that about five per cent of Indonesian manufacturing exporters in 1998 were newcomers to the category. They interpreted this as evidence that a few firms were able to shift sales from domestic to international markets.

Table 9.4 Distribution of plants by exporting status (%), the period 1995-96 to 2000

1995-96	1997		1998	
	Non exporting	Exporting	Non exporting	Exporting
Non exporting	95.7	4.3	99.6	0.4
Exporting	48.7	51.3	90.9	9.1

Table 9.4 continued

Table 9.4 concluded

1995-96	1999		2000	
	Non exporting	Exporting	Non exporting	Exporting
Non exporting	95.6	4.4	94.8	5.2
Exporting	50.9	49.1	43.7	56.3

However, the persistence is less for the other direction of the response. About half of the plants exporting in the pre-crisis period were no longer recorded as exporting in 1999 and 2000. Compared to related studies on firm export participation, this is a striking result as a large number of firms tend to remain exporting in a short period of time. While they might have been caused by a poor quality of the BPS survey response during the peak of the crisis, these statistics might simply point to the severity of the crisis and subsequent recovery. This argument is supported by looking at the relative frequency of the number of exporting plants in the crisis period that remained exporting in 1999 and 2000, which increased from 49.1 to 56.3 per cent. The increase implies the number of exporting plants in the pre-crisis period that returned to exporting had been increasing during those years.

Within the group of plants that become exporters in the crisis period, there is a strong indication that these firms became export oriented plants. This is shown in Table 9.5 which describes the export intensity distribution of these plants by classes of export intensity. The table shows about 60 to 70 percent were classified as plants with high export intensity (export intensity of greater than 0.5) and only 10 percent or less were classified as plants with low export intensity (plant export intensity less than 0.1).[9] This finding supports the observation from The World Bank's study mentioned earlier on the success of some firms in switching their sales orientation.

Table 9.5 Distribution of the new exporting plants in the crisis period (%) by exporting status

	1997	1998	1999	2000
Export intensity class:				
Low	7.6	8.5	11.4	11.8
Medium	15.5	21.3	30.1	27.7
High	76.9	70.2	58.5	60.6

Notes:

1. EXP_i is defined as the ratio of exports to output in plant i.
2. Definition of export intensity groups:

   Low: $0 < EXP_i < 0.1$

   Medium: $0.1 \leq EXP_i < 0.5$

   High: $EXP_i \geq 0.5$

The next two tables derive the facts related to the change in export intensity of existing exporters in the crisis period. In these tables, the sample of plants that exported continuously for every two points of time (e.g. 1996 and 1999 or 1996 and 2000) was assembled. Therefore, the numbers of plants for each pair of years are different to the number of plants continuously exporting during the period 1997-2000.

Table 9.6 gives the transition matrices that describe the movement in export intensity of these plants. It suggests large numbers of exporting plants in the pre-crisis period increased export intensity in the crisis period. About 70 percent of plants with low export intensity in the pre-crisis period moved to the class of plants with higher export intensity in 1999 and 2000. Similarly, almost 50 percent of plants with medium export intensity in 1996 moved to the class of plants with high export intensity. Table 9.6 also suggests that, for a given export

[9] The definition of the export intensity classification is given in Table 9.5.

intensity class, there is some degree of persistence in which plants are unlikely to have been downgraded to lower export intensity classes. For example, less than 10 percent of exporting plants with high export intensity in the pre-crisis period were downgraded to medium class export intensity in all years between 1997 and 2000.

Table 9.6 Distribution of continuously operating plants (%) by export intensity classes, the period 1995-96 to 2000.

1995-96	1997			1998		
	Export intensity class:			Export intensity class:		
	Low	Medium	High	Low	Medium	Large
Export intensity class:						
Low	59.1	27.0	13.9	65.5	31.0	3.4
Medium	10.7	54.8	34.4	4.3	46.4	49.3
High	0.6	8.4	91.0	0.6	8.3	91.2

Table 9.6 continued

Table 9.6 concluded

1995-96	1999			2000		
	Export intensity class:			Export intensity class:		
	Low	Medium	Large	Low	Medium	Large
Export intensity class:						
Low	30.0	34.0	36.0	26.2	38.9	34.9
Medium	10.4	41.7	47.9	8.4	45.3	46.3
High	1.4	8.3	90.3	0.9	7.8	91.2

Note: See Table 9.5 for the definition of export intensity classes.

Table 9.7 shows the percentage difference in export intensity of continuously exporting plants during the crisis and pre-crisis periods. Plants with all output exported in the periods (i.e. plants with export intensity equal to 1) were excluded from the sample because retaining them would have been likely to understate the statistics. The mean and median of the difference are -14 and -10 per cent for the peak of the crisis (period 1997-98), reflecting the severity of the impact on exports. However, the average becomes positive for the early recovery period (1999-2000). This positive average mostly reflects the rapid export recovery in this period referred to above.

Table 9.7 Percentage difference in plant export propensity ($\%\Delta EXP_{it}$) between periods 1997-2000 and 1995-96: descriptive statistics

Statistics	Percentage differences in plant export intensity ($\%\Delta EXP_{it}$)	
	Between 1997-98 and 1995-96 (Peak of the crisis)	Between 1999-2000 and 1995-96 (Early recovery)
Mean	-14.5	3.8
Median	-9.8	1.0
Standard deviation	69.1	89.5
Interquartile range	50.3	44.3
Percentiles:		
10%	-73.4	-84.2
25%	-43.1	-21.3
75%	7.3	22.9
90%	44.4	91.6

The table shows very a large variation in the difference, even in the early recovery period. The percentage difference for about 50 percent of the observations is bounded between -21 and 23 percent (i.e. the difference between the 75th and 25th percentiles). The bounding spread widens significantly, to between -84 and 92 percent, when another 30 percent of observations are added (i.e. the difference between the 90th and 10th percentiles). The description that many exporting plants sharply contracted their exported output is in line with the general perception that an export-led recovery did not materialise despite the large boost to competitiveness. The other part of the picture, which indicates a large expansion in export performance, suggests there are factors which allowed some plants to avoid the constraints of the export-led recovery. As indicated at the beginning, the results from the econometric analysis should shed some light on this.

Finally, the response of new plants entering the industry is outlined in Tables 9.8 and 9.9. Table 9.8 compares the share of exporting plants to total new entrants between the crisis and pre-crisis periods. The table suggests more export-oriented plants entered the industry after the crisis. The proportion of exporting entrants to total entrants increased from 14 per cent before the crisis to 21 per cent in 2000. This suggestion is supported by Table 9.9 which shows that the relative frequency of exporting entrants classified as plants with high export intensity increases in 2000 compared to before the crisis.

Table 9.8 Distribution of entrants (%) by type of exporting plants, 1995-2000

	1995-96	1997	1998	1999	2000
Non exporting	86.3	85.5	100.0	87.0	78.7
Exporting	13.7	14.5	0.0	13.0	21.3

Table 9.9 Distribution of exporting entrants (%) by the classes of export intensity, 1995-2000

	1995-96	1997	1998	1999	2000
Export intensity classes:					
Low	6.8	5.7	0.0	5.8	3.3
Medium	16.7	9.0	0.0	9.9	13.3
High	75.0	85.2	0.0	84.3	83.3

Note: see Table 9.5 for the definition of export intensity classes.

In summary, all tables seem to point to five basic facts about the export supply response of firms in the crisis period.

First, in contrast to the unclear indication on a positive export supply response to the crisis, the extent of the recovery in micro export behaviour is very clear. The export participation rate recovered immediately in 1999 and continued in the following year. As suggested by other studies, one important factor that propelled the recovery in 2000 was the demand recovery of other Asian countries from the region wide crisis of 1997/98.

Second, while there is evidence of switching status from exporting to non-exporting, the number of plants that switched was very small relative to the total non-exporting plants.

Third, there is evidence to suggest a large number of exporting plants increased their propensity to export during the crisis period. Moreover, exporting plants are unlikely to have been less export oriented.

Fourth, there is a large variation in the impact of the crisis on export performance across plants. This indicates there are some factors which allowed some plants to overcome the constraints of an export-led recovery.

Finally, there is evidence to suggest more export-oriented plants entered the industry after the crisis.

9.5.1.1 Did foreign plants in the industry respond better than their domestic counterparts?

As noted, Blomstrom and Lipsey (1993) demonstrated that multinationals in Latin America responded better to the debt crisis in the region in terms of export performance. It is useful to examine whether the same picture can be found for Indonesia in the case of the 1997/98 crisis. Therefore the analysis is extended based on several tables presented earlier.

Table 9.10 presents the distribution of the number of non-exporting plants in the pre-crisis period that switched to exporting during the crisis period by ownership status (foreign, private domestic and government).[10] The table seems to suggest an increased importance of foreign ownership in determining switching behaviour. Excluding the distribution of 1998, the table shows an increasing trend in the number of foreign plants – relative to the total – that switched during this period. Confirming this suggestion, it is observed that there was a declining trend in the relative number of switching domestic-private plants in this period.

Table 9.10 Distribution of new exporting plants during the crisis period (%) by status of plant ownership

	1997	1998	1999	2000
Foreign	9.4	23.4	12.5	14.6
Domestic-private	83.2	72.3	81.3	77.6
Government	7.4	4.3	6.2	7.8
Total	100	100	100	100

Note: See Chapter 7 for the definition of the ownership groups.

However, the picture painted by Table 9.10 does not perfectly match the other direction of switching, i.e., from exporting to non-exporting. This is shown in Table 9.11, which presents the distribution of the number of exporting plants in the pre-crisis period that became non-exporting plants in the crisis period by the plants' ownership status. To strongly confirm the suggestion from Table 9.10, a robust indication of declining trend in the relative number of foreign plants that became non-exporting plants over the period should be expected. Table 9.11 either does not show this trend, or only weakly supports it. The relative number of

[10] See Section 7.3 for the definition of the ownership status.

foreign exporting plants becoming non-exporting ones in this period exhibits an inverted U-shaped pattern, which peaked in 1999.

Table 9.11 Distribution of the switched plants from exporting to non-exporting during the crisis period (%) by status of plant ownership

	1997	1998	1999	2000
Foreign	19	20.7	22.9	22.6
Domestic-private	75.3	73.9	72.6	72.3
Government	5.7	5.4	4.5	5.1
Total	100	100	100	100

Note: See Chapter 7 for the definition of the ownership groups.

To get a picture regarding the change in export intensity, Tables 9.6 and 9.7 were disaggregated by plant ownership status with the results presented in Tables 9.12 and 9.13. First, consider Table 9.12, which displays the transition matrices of export intensity of the continuously exporting plants by plant ownership status. There is a picture that foreign plants were more successful in increasing export intensity during the crisis period, particularly compared with domestic private plants. The percentage of plants able to move to a higher class of export intensity during the period in general is higher for the group of foreign plants, relative to the group of domestic private plants. For example, focusing on the transition matrix of 1999, about 57 per cent of foreign plants in the pre-crisis period moved from the medium export intensity class, to the high export intensity class compared with 43 per cent for the group of domestic private plants.

Table 9.12 Distribution of continuously exporting plants (%) by export intensity classes and ownership status, period 1995-96 to 2000

1995-96	1997			1998			1999			2000		
	Export intensity classes			Export intensity classes			Export intensity classes			Export intensity classes		
	Low	Medium	High	Low	Medium	Large	Low	Medium	Large	Low	Medium	Large
Export intensity classes:												
Low												
Foreign	47.8	30.4	21.7	50.0	25.0	25.0	17.4	47.8	34.8	24.1	48.3	27.6
Private domestic	64.7	23.5	11.8	68.0	32.0	0.0	31.9	29.0	39.1	28.4	35.2	36.4
Government	28.6	57.1	14.3	n.a	n.a	n.a	50.0	37.5	12.5	11.1	44.4	44.4
Medium												
Foreign	6.8	48.6	44.6	5.3	31.6	63.2	9.4	34.0	56.6	3.2	49.2	47.6
Private domestic	12.6	57.0	30.4	4.3	51.1	44.7	11.8	45.5	42.8	10.6	45.4	44.0
Government	5.6	55.6	38.9	0.0	66.7	33.3	0.0	26.3	73.7	0.0	26.7	73.3
High												
Foreign	0.4	6.7	92.9	0.0	13.1	86.9	0.9	6.6	92.6	0.7	4.5	94.8
Private domestic	0.7	8.5	90.8	0.9	6.0	93.2	1.5	8.3	90.2	0.9	8.8	90.3
Government	0.0	17.4	82.6	0.0	0.0	100.0	1.7	15.0	83.3	1.5	7.7	90.8

Notes: 1) The number of exporting plants is not the same for every pair of the plants distribution in respect to 1996 (e.g. 1996 and 1998 or 1996 and 2000). This is to take into account that exporting is not a once-and-forever phenomenon (see text for more details).

2) n.a. = not applicable.

The superior response of foreign plants can also be observed in Table 9.13, which displays the summary statistics of the percentage difference in export intensity between the crisis and pre-crisis periods of the continuously exporting plants. The average contraction in export intensity during the peak of the crisis is lowest for the group of foreign plants. As for the early recovery period, the average expansion in export intensity is higher for the group of foreign plants.

However, the statistics for the variation in the differences do not really suggest a superiority of foreign plants. While the variation during the peak of the crisis is similar across the group of plants, it changes significantly in the early recovery. The variation is significantly higher for the group of foreign plants, relative to the other groups of plants. This picture suggests foreign plants did not necessarily respond better than other plants in terms of export intensity.

Table 9.13 Percentage difference in plant export intensity ($\%\Delta EXP_{it}$) between periods 1997-2000 and 1995-96 by status of plant ownership: descriptive statistics

Statistics	Percentage differences in plant export intensity ($\%\Delta EXP_{it}$)	
	Between 1997-98 and 1995-96 (Peak of the crisis)	Between 1999-2000 and 1995-96 (Early recovery)
Mean		
Foreign	-6.97	21.80
Private domestic	-17.03	-1.26
Government	-12.60	8.00
Median		
Foreign	-7.69	5.13
Private domestic	-10.50	0.00
Government	-10.97	1.00
Standard deviation		
Foreign	67.10	102.10
Private domestic	70.28	87.89
Government	60.64	65.30
Interquartile range		
Foreign	54.90	48.90
Private domestic	49.10	44.62
Government	68.00	28.87

All in all, the last five tables give an impression that foreign ownership is one of the important determinants of the export response supply in Indonesian manufacturing. In particular, the extent of switching to exporting increased during the crisis period and the expansion in export intensity is highest for foreign owned plants. This picture is consistent and supports the findings from the previous chapter which show a positive relationship between foreign ownership and export supply response in the early recovery period. However, the inference needs to be considered with caution, simply because there are no available studies which can be used to compare the results.

9.5.2 Regression results and discussion

9.5.2.1 Regression results[11]

Export participation equations

Table 9.14 reports the maximum likelihood estimation results of the export participation equation (i.e. equation 9.5) for the full sample, which consists of all continuously operating plants during the period 1997-2000. Some experimented specifications were reported in the table. The table reports the robust standard error since data examination revealed that the variance is heteroscedastic. The Wald test for overall significance in all specifications passes at the 1 per cent level. The Wald test for exogeneity of EP_{9596} was rejected at the 1 percent level in all specifications, confirming the prediction that the variable is endogenous. The instruments used were two year lags of the EP variable, EP_{93} and EP_{94}, and a one year lag of all explanatory variables representing plant characteristics.

To be consistent with the previous chapter, $PCI2_{9596}$ and $PSI2_{9596}$ were used instead $PCI1_{9596}$ and $PSI1_{9596}$. The industry factor intensity variables $ICI2$ and $ISI1$ yielded similar results to $ICI1$ and $ISI2$. Based on overall significance tests (the Wald test), only $ICI1$ and $ISI2$ based estimates are reported.

[11] Unless otherwise state, the regression results were computed by author from the data base.

Table 9.14 Determinants of export participation in the crisis period: regressions results

Dependent variable	$EP_{i,t}$							
Specification	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8
$EP_{i,9596}$	1.755 (53.79)**	1.755 (53.79)**	1.889 (65.21)**	1.667 (47.73)**	1.696 (49.63)**	1.696 (49.58)**	1.666 (47.49)**	1.688 (49.53)**
$\log(LP_{i,9596})$	0.035 (3.45)**	0.035 (3.49)**	0.048 (4.78)**	0.036 (3.54)**	0.039 (3.78)**	0.031 (3.12)**	0.036 (3.49)**	0.036 (3.60)**
$PCI2_{i,9596}{}^{(a)}$	0.010 (2.60)**	0.010 (2.64)**	0.010 (2.85)**	0.041 (1.99)*	0.010 (2.58)**	0.044 (2.25)*	0.040 (1.92)+	0.010 (2.60)**
$PSI2_{i,9596}{}^{(a)}$	0.029 (1.87)+	0.028 (1.88)+	0.033 (2.17)*	0.025 (1.67)+	0.031 (2.02)*	0.028 (1.80)+	0.041 (1.63)	0.032 (2.01)*
$FOR_{i,9596}$	0.062 (1.39)		0.074 (1.63)	0.035 (0.78)	0.049 (1.08)	0.021 (0.48)	0.034 (0.75)	0.024 (0.54)
$DFOR_{i,9596}$		-0.074 (0.93)						
$DFOR_{i,9596}*FOR_{i,9596}$		0.159 (1.44)						
$\log(SIZE_{i,9596})$	0.128 (13.37)**	0.128 (13.41)**		0.129 (13.49)**	0.129 (13.40)**	0.127 (13.75)**	0.130 (13.53)**	0.123 (13.29)**
$SIZE_{i,9596}{}^{(a)}$			0.005 (3.40)**					
$(SIZE_{i,9596})^{2\,(b)}$			-0.008 (1.47)					
$\log(AGE_{i,96})$	-0.075 (5.96)**	-0.075 (5.96)**	-0.050 (4.02)**	-0.061 (4.82)**	-0.065 (5.14)**	-0.014 (4.76)**	-0.062 (4.86)**	-0.056 (4.47)**
$IMDEP_{i,9596}$	-0.035 (0.82)	-0.034 (0.79)	0.017 (0.41)	-0.037 (0.88)	-0.022 (0.51)	-0.111 (2.73)**	-0.035 (0.81)	-0.093 (2.31)*
$INEXP_{j,9596}$				1.087 (9.51)**		1.017 (14.07)**	1.102 (9.58)**	0.254 (12.98)**
$RNEXP_{j,9596}$				0.613 (6.12)**		0.547 (5.60)**	0.612 (6.10)**	0.558 (5.74)**

Table 9.14 continued

Table 9.14 concluded

Dependent variable	EP_t							
Specification	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8
$IEXP_{j,9596}$					0.496 (6.54)**			
$REXP_{j,9596}$					0.442 (6.42)**			
$DRI_{j,9596}$						0.027 (0.94)		
$DLI_{j,9596}$						0.004 (0.16)		
$IRI_{j,95}$							0.438 (1.82)+	
$ICI1_{j,9596}{}^{(b)}$							-0.087 (0.84)	
$ISI2_{j,9596}$							0.087 (1.19)	
$COMP_{j,89}$								0.084 (3.77)**
Year Dummy 1998	-1.343 (34.71)**	-1.343 (34.71)**	-1.325 (34.63)**	-1.354 (34.76)**	-1.352 (34.60)**	-1.351 (34.63)**	-1.354 (34.75)**	-1.352 (34.69)**
Year Dummy 1999	-0.023 (0.97)	-0.023 (0.97)	-0.018 (0.77)	-0.024 (0.98)	-0.023 (0.94)	-0.023 (0.98)	-0.023 (0.98)	-0.023 (0.98)
Year Dummy 2000	0.115 (0.00)	0.115 (5.00)**	0.118 (5.17)**	0.117 (5.01)**	0.116 (5.03)**	0.115 (4.98)**	0.117 (5.01)**	0.116 (5.00)**
Dummy variables for industries	Included	Included	Included	Included	Included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included	Included	Included
Constant	-2.565 (14.87)**	-2.568 (14.60)**	-2.122 (12.60)**	-2.932 (16.21)**	-2.908 (15.54)**	-2.930 (15.98)**	-3.276 (13.69)**	-2.956 (16.44)**
Wald chi2	10429.5	10379.6	10383.0	10256.1	10304.86	10231.5	10264.4	10172.4
Wald exogeneity test	484.8	391.5	392.1	317.7	339.97	332.6	315.3	331.5

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

Three variables, LP_{9596}, $SIZE_{9596}$ and AGE_{96}, were experimented with in logarithmic forms to capture the possible non-linear relationship to the dependent variables. Based on the overall significance test, we decided to specify the variables in their logarithmic forms. Industry and region dummy variables were defined at four-digit ISIC level and provinces.

The coefficients on year dummy variables reconfirm much of what was derived from the descriptive results. The probability to export was significantly low at the peak of the crisis (i.e. 1998) but began to improve in 2000. The statistical insignificance of the coefficients for the year dummy variable 1999 suggests that year marked the early stage of the recovery.

In specification 9.1, the export participation response in the crisis period is specified only as a function of all firm level variables.

The coefficient of EP_{9596} is large, positive and statistically very significant. Therefore, being exporting plants in the pre-crisis period had a strong and positive impact on the likelihood of continuing to export. This confirms the earlier observation in the descriptive analysis where only a very small fraction of non-exporting plants in the crisis period switched to exporting. The magnitude of the variable suggests exporting history is economically important. Exporting before the crisis increased the probability of continuing to export during the crisis period by 35 per cent.

In addition, EP_{9596} is one of the strongest variables affecting export participation. Examining the correlation matrix in Appendix 9.1, the partial correlation coefficient between EP_{9596} and EP is 0.4. This is substantially large compared with the correlation coefficient of the other explanatory variables.

All in all, the findings support the theoretical models of export decision with sunk-export costs.

The coefficients of $\log(LP_{9596})$, $PCI2_{9596}$, $PSI2_{9596}$ are positive and statistically significant, although $PSI2_{9596}$ is only moderately significant at the 10 per cent level. This finding strongly supports the self-selection hypothesis, where firms need to be efficient to compete in competitive export markets. Despite this, the coefficients of $PCI2_{9596}$, $PSI2_{9596}$ are very small, indicating that the positive effect of plant level factor intensity is not economically important.

Although positive, the coefficient of FOR_{9596} is not statistically significant (even at the 10 per cent level). Thus, foreign ownership does not guarantee a positive response in export participation. This is a surprising finding, particularly in light of the earlier results, and those from other studies (e.g. Blomstrom and Lipsey 1993). One possible explanation is that the positive effect might have applied only to plants with a very high foreign ownership share. In other words, it essentially implies the hypothesis that parent companies could restrict the flow of their firm-specific resources, depending on the foreign share in the affiliates. Therefore, testing this hypothesis means seeking validity for this possible explanation. This was done in specification 9.2, by substituting FOR_{9596} for $DFOR_{9596}$ and $DFOR_{9596} * FOR_{9596}$. The coefficient of the interaction variable is positive but is not statistically significant. Therefore, the results only weakly validate the possible explanation, despite providing some support for the hypothesis. Before speculating further, it is important to examine whether the results would change if the equation was estimated on the separate sample of exporting and non-exporting plants. The insignificant coefficient, both on FOR_{9596} and $DFOR_{9596} * FOR_{9596}$, may have been affected simply by the structure of the sample.

The results show that the specification of foreign ownership in specification 9.2 can be used as an alternative specification to FOR_{9596} in specification 9.1. The coefficients of the other variables in these two specifications are the same. However, based on the overall specification test, only the latter is considered as the basis of estimation in the other specifications.

The coefficient of $log(SIZE_{9596})$ is positive and statistically very significant, suggesting larger plants had a higher probability of participating in export during the crisis period.[12] In addition, the correlation matrix in Appendix 9.1 shows the positive relationship was strong in comparison to those of the other explanatory variables. The finding supports the general hypothesis that the probability of being an exporter increases with size. More importantly, it provides additional evidence to support the self-selection hypothesis, since one possible

[12] Linear specification of $SIZE_{9596}$ was experimented with at the experimental stage, but did not perform very well compared to its logarithm specification in terms of the overall significance test.

reason for the observed positive relationship is the cost advantage derived from economies of scale.

It is worth commenting here on the experimental result with the quadratic term of $SIZE_{9596}$ (specification 9.3). The quadratic specification is of particular interest to an established proposition in the exporting literature, namely that the effect of size on firms' exporting behaviour and performance may be positive but diminishes (Bonaccorsi 1992). The results only weakly support this proposition. The coefficient of the quadratic term, although negative as proposed, was statistically insignificant. Further, this specification performed less well in terms of the overall significance test compared with specification 9.1. For this reason, the log specification is the preferred specification.

The result indicates younger firms had a higher chance of participating in export during the crisis period. The coefficient of $log(AGE_{96})$ is negative and statistically significant, not only in specifications 9.1 to 9.3, but also in the other specifications. The finding points to the 'dynamism' argument of younger firms and the assertion that younger firms in Indonesia tend to be more export orientated than older firms.

$IMDEP_{9596}$ is negatively related to export participation during the crisis period. This finding supports the theoretical prediction that the positive impact of exchange rate depreciation on performance can be mitigated if a firm uses a large share of imported input in their input mix (Forbes 2002a). It also supports the finding from The World Bank's firm-level survey (as reported in Bappenas et al. (2000), that manufacturing exporters in Indonesia rated the rising costs caused by the sharp exchange rate depreciation as one of the major causes for their declining performance during the crisis. Despite the relationship, the coefficients are often statistically insignificant across the specifications. Therefore, being dependent on imported inputs does not necessarily mean a lower chance of participating in export during the crisis period.

Specifications 9.4 and 9.5 introduced the variables representing the export spillover effect. The results of these specifications clearly point to the importance of spillovers, either for industry or region. All export spillover variables ($INEXP_{9596}, RNEXP_{9596}, IEXP_{9596}$ and $REXP_{9596}$) are positive and statistically very significant. Thus, a plant's export participation response is likely to have been higher if located in either an export oriented industry or a region with a high density of exporters. The finding supports the theoretical prediction that externalities arising from local export activities help to reduce the cost of entry into export markets.

Specifications 9.6, 9.7 and 9.8 introduce the variables representing industry competitiveness prior to the crisis. DCI_{9596} was used as the base dummy variable (in specification 9.6). The export spillover variables included in these specifications were $INEXP_{9596}$ and $RNEXP_{9596}$, based on the overall significant test.[13]

Of all the variables used to proxy factor intensity, only the coefficient of IRI_{9596} was statistically significant – albeit only at the 10 per cent level. However, this does not mean industry competitiveness prior to the crisis was not important. As mentioned, the factor intensity variables may hide much over time variation in industry competitiveness. For this reason, $COMP_{89}$ was introduced, substituting for the other factor intensity variables (i.e. specification 9.8).[14] This specification gives a better result as now the coefficient of $COMP_{89}$ is very statistically significant.

Therefore, the results support the hypothesis of the Heckscher-Ohlin model. The coefficient of all considered industry factor intensity variables shows the expected sign. From the results, it is suggested that the probability of participating in the export market during the crisis period may have been higher for plants in industries which had a high RCA index previously and, to some extent, resource intensive industries.

Table 9.15 presents the maximum likelihood estimation results of equation 9.5 for the exporting sample. Obviously, EP_{9596} was not included because the sample contains only exporting plants,.

[13] At the experimental stage, specifications with $IEXP_{9596}$ and $REXP_{9596}$ were tried and the results were similar.

[14] Industry dummy variables were not included in the specifications where the industry factor intensity variables are the dummy variables (i.e. DRI_{9596} and DLI_{9596}) and $COMP_{89}$. This is to minimise the collinearity problem between the industry factor intensity variables and the industry dummies.

Table 9.15 Determinants of export participation in the crisis period, sample of all exporting plants: regressions results

Dependent variable	$EP_{i,t}$									
Specification	9.9	9.10	9.11	9.12	9.13	9.14	9.15	9.16	9.17	9.18
$\log(LP_{i,9596})$	0.016 (1.11)	0.017 (1.18)	0.030 (2.28)*			0.021 (1.42)	0.016 (1.10)	0.01 -0.67	0.029 (1.99)*	0.011 -0.79
$PCI2_{i,9596}$ [(a)]	-0.002 (0.09)	-0.002 (0.08)		0.027 (1.01)		-0.001 (0.35)	-0.003 (0.11)	0.001 -0.05	0.004 -0.15	0.007 -0.27
$PSI2_{i,9596}$	0.002 (2.19)*	0.002 (2.27)*			0.002 (2.96)**	0.002 (2.21)*	0.002 (2.48)*	0.002 (2.30)*	0.002 (2.14)*	0.002 (2.55)*
$FOR_{i,9596}$	0.150 (3.17)**		0.164 (3.50)**	0.180 (3.87)**	0.155 (3.28)**	0.121 (2.52)*	0.120 (2.52)*	0.123 (2.62)**	0.123 (2.56)*	0.122 (2.60)**
$DFOR_{i,9596}$		-0.106 (1.29)								
$DFOR_{i,9596}*FOR_{i,9596}$		0.280 (2.52)*								
$\log(SIZE_{i,9596})$	0.097 (8.45)**	0.098 (8.51)**	0.098 (8.49)**	0.099 (8.60)**	0.098 (8.52)**	0.097 (8.40)**	0.092 (7.89)**	0.092 (8.32)**	0.098 (8.49)**	0.088 (7.93)**
$\log(AGE_{i,96})$	-0.050 (3.25)**	-0.050 (3.25)**	-0.047 (3.10)**	-0.045 (2.99)**	-0.049 (3.22)**	-0.043 (2.74)**	-0.038 (2.46)*	-0.042 (2.80)**	-0.035 (2.24)*	-0.039 (2.57)*
$IMDEP_{i,9596}$	-0.004 (0.07)	-0.005 (0.08)	0.009 (0.17)	0.018 (0.33)	-0.001 (0.01)	-0.013 (0.23)	-0.003 (0.05)	-0.097 (1.94)+	-0.022 -0.41	-0.079 -1.59
$INEXP_{j,9596}$						0.959 (6.17)**		0.821 (8.77)**	0.927 (5.89)**	0.781 (8.32)**
$RNEXP_{j,9596}$						0.322 (2.60)**		0.245 (2.06)*	0.3 (2.42)*	0.249 (2.09)*
$IEXP_{j,9596}$							0.647 (6.12)**			
$REXP_{j,9596}$							0.536 (5.72)**			

Table 9.15 continued

Table 9.15 concluded

Dependent variable	$EP_{i,t}$									
Specification	9.9	9.10	9.11	9.12	9.13	9.14	9.15	9.16	9.17	9.18
$DRI_{j,9596}$								0.068 -1.52		
$DLI_{j,9596}$								0.049 -1.18		
$IRI_{j,95}$									0.636 (2.32)*	
$ICI1_{j,9596}$ (b)									-0.286 (1.91)+	
$ISI2_{j,9596}$									-0.297 (2.65)**	
$COMP_{j,89}$										0.106 (3.25)**
Year Dummy 1998	-1.415 (35.38)**	-1.416 (35.39)**	-1.414 (35.35)**	-1.414 (35.34)**	-1.415 (35.37)**	-1.418 (35.34)**	-1.420 (35.32)**	-1.413 (35.29)**	-1.419 (35.33)**	-1.415 (35.31)**
Year Dummy 1999	-0.047 (1.48)	-0.047 (1.48)	-0.047 (1.48)	-0.047 (1.49)	-0.047 (1.48)	-0.047 (1.48)	-0.047 (1.48)	-0.047 -1.48	-0.047 -1.48	-0.047 -1.48
Year Dummy 2000	0.135 (4.27)**	0.135 (4.27)**	0.135 (4.27)**	0.135 (4.27)**	0.135 (4.27)**	0.136 (4.30)**	0.136 (4.29)**	0.135 (4.27)**	0.136 (4.30)**	0.135 (4.27)**
Dummy variables for industries	Included	Included	Included	Included	Included	Included	Included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Constant	-0.878 (3.62)**	-0.879 (3.63)**	-0.882 (3.65)**	-0.761 (3.23)**	-0.820 (3.46)**	-1.258 (5.08)**	-1.367 (5.41)**	-1.224 (5.01)**	-1.554 (4.99)**	-1.221 (5.07)**
Pseudo R-squared Wald chi2	0.16 1965.8	0.16 1961.7	0.16 1953.8	0.16 1948.6	0.16 1957.3	0.16 1989.0	0.16 1983.1	0.16 1985.2	0.16 1934.8	0.16 1945.6

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

Although most of the results derived from the estimation for the full sample hold, a few differences are observed. First, there seems to be weaker evidence for the self-selection hypothesis. In the first specification, only $PSI2_{9596}$ is statistically significant among the relevant variables ($\log(LP_{9596})$, $PCI2_{9596}$, $PSI2_{9596}$). Moreover, $PCI2_{9596}$ shows a negative sign. While this might be showing the underlying behaviour, these results may have been affected by strong collinearity between the relevant variables. Because of this, each of the variables was included separately in specifications 9.11 to 9.13 and the results improved. Now $\log(LP_{9596})$ is statistically significant and $PCI2_{9596}$ shows the expected sign, although it is statistically insignificant. Therefore in conclusion, the results still provide some support for the self-selection hypothesis.

Much stronger evidence is observed for the positive effect of foreign ownership. The coefficients of FOR_{9596} are positive across all specifications and very statistically significant. Therefore, foreign plants are likely to have continued to export during the crisis. A 10 per cent increase in foreign share increases the probability of survival in exporting during the crisis by 27 per cent.

The coefficient of $DFOR_{9596} * FOR_{9596}$ is now statistically significant (see specification 9.10). Along with a positive sign, the coefficient shows the probability of surviving as exporters during the crisis period was higher for foreign plants with a higher foreign share. This suggests the channels provided by parent companies that allowed affiliates to continue exporting, such as marketing networks and financial support, could only have been beneficial if there was a substantial degree of foreign control in the affiliates. Therefore, this finding gives more convincing evidence on the hypothesis that parent companies might restrict the transfer of their firm specific assets (Ramstetter 1999), since the channels are usually part of the firm specific assets transferred to affiliates.

Finally, more convincing evidence is also observed for the impact of industry factor intensity. IRI_{9596} and $COMP_{89}$ are now more statistically significant compared with the results for the full sample. Moreover, $ISI2_{9596}$ is negatively related to export participation during the crisis period, suggesting that the probability to remain exporting in the period was higher for plants in low-skilled labour intensive industries.

Table 9.16 presents the maximum likelihood estimation results for the export participation equation for the non-exporting sample. As with the previous estimations, there are only a few differences compared to the results for the full sample. First, there is much stronger evidence supporting the self-selection hypothesis. The coefficients of $\log(LP_{9596})$ and $PCI2_{9596}$ are very statistically significant. These results hold even when the variables are included individually to minimize collinearity between $\log(LP_{9596})$, $PCI2_{9596}$, $PSI2_{9596}$ (specifications 9.21 to 9.23).

Table 9.16 Determinants of export participation in the crisis period, sample of the non-exporting plants: regressions results

Dependent variable	$EP_{i,t}$									
Specification	9.19	9.2	9.21	9.22	9.23	9.24	9.25	9.26	9.27	9.28
$\log(LP_{i,9596})$	0.048 (3.26)**	0.048 (3.23)**	0.059 (4.17)**			0.041 (2.79)**	0.057 (3.82)**	0.037 (2.48)*	0.044 (2.92)**	0.037 (2.52)*
$PCI2_{i,9596}$	0.001 (2.68)**	0.001 (2.62)**		0.001 (3.86)**		0.001 (2.10)*	0.001 (2.67)**	0.001 (1.83)+	0.001 (2.13)*	0.001 (2.15)*
$PSI2_{i,9596}$ [(a)]	-0.001 (0.09)	-0.001 (0.10)			0.020 (1.45)	-0.006 (0.46)	0.001 (0.07)	-0.005 (0.37)	-0.006 (0.43)	-0.002 (0.16)
$FOR_{i,9596}$	0.378 (4.08)**		0.379 (4.09)**	0.429 (4.71)**	0.442 (4.91)**	0.325 (3.51)**	0.347 (3.75)**	0.318 (3.47)**	0.325 (3.52)**	0.324 (3.55)**
$DFOR_{i,9596}$		0.031 (0.18)								
$DFOR_{i,9596}*FOR_{i,9596}$		0.336 (1.34)								
$\log(SIZE_{i,9596})$	0.281 (21.26)**	0.281 (21.25)**	0.283 (21.36)**	0.292 (22.95)**	0.296 (23.31)**	0.272 (20.45)**	0.285 (21.39)**	0.268 (21.27)**	0.272 (20.34)**	0.265 (21.01)**
$\log(AGE_{i,96})$	-0.107 (6.92)**	-0.106 (6.92)**	-0.106 (6.89)**	-0.107 (6.94)**	-0.106 (6.90)**	-0.085 (5.42)**	-0.098 (6.28)**	-0.084 (5.35)**	-0.087 (5.52)**	-0.082 (5.25)**
$IMDEP_{i,9596}$	0.188 (2.92)**	0.187 (2.90)**	0.188 (2.91)**	0.213 (3.35)**	0.219 (3.44)**	0.129 (1.96)+	0.175 (2.69)**	0.060 (0.95)	0.131 (1.99)*	0.056 (0.89)
$INEXP_{j,9596}$						1.494 (9.01)**		1.686 (17.44)**	1.518 (9.04)**	1.628 (16.38)**
$RNEXP_{j,9596}$						1.353 (8.52)**		1.301 (8.38)**	1.351 (8.49)**	1.260 (8.15)**
$IEXP_{j,9596}$							0.618 (5.57)**			
$REXP_{j,9596}$							0.659 (6.45)**			

Table 9.16 continued

Table 9.16 concluded

Dependent variable	$EP_{i,t}$									
Specification	9.19	9.2	9.21	9.22	9.23	9.24	9.25	9.26	9.27	9.28
$DRI_{j,9596}$								0.104 (2.57)*		
$DLI_{j,9596}$								0.051 (1.28)		
$IRI_{j,95}$									0.038 (0.12)	
$ICI1_{j,9596}$ (b)									-0.277 (1.70)+	
$ISI2_{j,9596}$									0.126 (1.16)	
$COMP_{j,89}$										0.069 (2.22)*
Year Dummy 1998	-0.980 (15.53)**	-0.980 (15.53)**	-0.979 (15.52)**	-0.979 (15.50)**	-0.977 (15.48)**	-0.996 (15.62)**	-0.984 (15.47)**	-0.990 (15.55)**	-0.996 (15.60)**	-0.989 (15.59)**
Year Dummy 1999	-0.094 (2.67)**	-0.094 (2.67)**	-0.094 (2.67)**	-0.092 (2.61)**	-0.091 (2.59)**	-0.097 (2.73)**	-0.092 (2.62)**	-0.094 (2.65)**	-0.096 (2.71)**	-0.094 (2.65)**
Year Dummy 2000	0.015 (0.45)	0.015 (0.45)	0.015 (0.46)	0.017 (0.50)	0.018 (0.52)	0.012 (0.35)	0.016 (0.47)	0.014 (0.42)	0.013 (0.37)	0.015 (0.43)
Dummy variables for industries	Included	Included	Included	Included	Included	Included	Included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Constant	-3.045 (15.13)**	-3.045 (15.12)**	-3.079 (15.32)**	-2.908 (14.84)**	-2.914 (14.86)**	-3.498 (16.53)**	-3.449 (16.57)**	-3.583 (16.81)**	-3.567 (11.97)**	-3.512 (16.76)**
Pseudo R-squared Wald chi2	0.15 1354.4	0.15 1355.2	0.15 1348.5	0.15 1342.3	0.15 1342.4	0.16 1368.3	0.17 1439.1	0.16 1361.1	0.17 1449.5	0.16 1323.2

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

Second, as with the estimation for the exporting sample, stronger evidence for the positive effect of foreign ownership is also observed. The coefficients of FOR_{9596} are statistically very significant across all specifications. Moreover, the coefficients suggest an economically important effect for foreign ownership. Based on specification 9.19, a 10 per cent increase in foreign share increases by 29 per cent the probability of non-exporting plants before the crisis becoming exporting plants in the crisis period.

The third difference is that the coefficients of $IMDEP_{9596}$ are positive and often statistically significant across all specifications. This is in contrast to the earlier finding for full and exporting samples and hence does not support our earlier comment. Despite this, the results are consistent with the self-selection hypothesis. The intensive use of imported inputs is often thought to be positively related to product quality. As mentioned, it is often asserted in the literature that one factor determining success in the export market is the ability to produce high quality products.

Finally, similar to the results for the exporting sample, there is more convincing evidence on the effect of industry factor intensity. $COMP_{89}$ and DRI_{9596} become statistically significant, although the opposite is observed for IRI_{9596}. This finding supports the earlier comment made based on the results for the full sample.

Export propensity adjustment equation

Table 9.17 reports the results from the OLS estimations of some alternative specifications for the export propensity adjustment equation (i.e. equation 9.6). The corresponding results of the maximum likelihood estimations for the export participation equation were presented and discussed earlier in Table 9.15. The estimated coefficients of the inverse Mills ratio are positive and significant in all specifications, suggesting a positive correlation in the disturbance between the export participation equation and the export propensity adjustment equation. Therefore, neglecting this correlation would likely give biased estimates in the export propensity adjustment equation.

Specification 9.29 in the table includes all plant level variables. Two coefficients of variables representing superior characteristics ($\log(LP_{9596})$, $PSI2_{9596}$) have the expected signs and the coefficient of $PSI2_{9596}$ was statistically very significant. In contrast, the coefficient of

$PCI2_{9596}$ does not show the expected sign. Again, this may be due to collinearity between the three variables. Therefore, each of these variables was introduced individually in specifications 9.31 to 9.33 and the result improved. The coefficient of $PCI2_{9596}$ in specification 9.32 changes to positive and is now statistically very significant.

The results show the importance of foreign ownership. The coefficients of FOR_{9596} are positive, large and statistically very significant across all specifications. This finding confirms the earlier observation in the descriptive analysis and is in line with the finding from the estimation of export participation equations for both exporting and non-exporting samples. The results in specification 9.30 also show a positive coefficient of $DFOR_{9596} * FOR_{9596}$, providing more support for the hypothesis that parent companies might restrict the transfer of firm specific assets to affiliates. This finding is also consistent with the finding from the export participation equation.

Table 9.17 Determinants of adjustment in export propensity during the crisis: regression results

Dependent variable	$\Delta EXP_{i,t}$										
Specification	9.29	9.30	9.31	9.32	9.33	9.34	9.35	9.36	9.37	9.38	9.39
$\log(LP_{i,9596})$	0.131 (5.74)**	0.135 (5.89)**	0.270 (12.01)**			0.160 (6.88)**	0.161 (6.94)**	0.123 (5.40)**	0.100 (4.45)**	0.218 (8.90)**	0.110 (4.89)**
$PCI2_{i,9596}$ [(a)]	-0.041 (0.86)	-0.041 (0.85)		0.020 (5.01)**		-0.016 (0.33)	-0.010 (1.68)+	-0.043 (0.88)	0.043 (0.88)	0.014 (0.26)	0.010 (1.82)+
$PSI2_{i,9596}$	0.016 (11.92)**	0.016 (11.99)**			0.018 (14.35)**	0.016 (12.39)**	0.016 (12.08)**	0.016 (12.22)**	0.017 (13.08)**	0.015 (11.86)**	0.018 (13.43)**
$FOR_{i,9596}$	0.741 (8.24)**		0.908 (9.88)**	1.066 (11.28)**	0.783 (8.65)**	0.909 (9.67)**	0.573 (6.73)**	0.525 (6.20)**	0.569 (6.64)**	0.582 (6.82)**	0.568 (6.66)**
$DFOR_{i,9596}$		-0.442 (3.22)**									
$DFOR_{i,9596}*FOR_{i,9596}$		1.276 (6.31)**									
$\log(SIZE_{i,9596})$	0.653 (18.08)**	0.655 (18.05)**	0.676 (18.68)**	0.696 (18.98)**	0.659 (18.09)**		0.650 (18.52)**	0.597 (17.76)**	0.604 (17.32)**	0.651 (18.50)**	0.583 (17.42)**
$SIZE_{i,9596}$						0.001 (14.89)**					
$(SIZE_{i,9596})^{2}$ [(b)]						-0.002 (14.91)**					
$\log(AGE_{i,96})$	-0.257 (8.67)**	-0.255 (8.63)**	-0.242 (8.30)**	-0.230 (7.98)**	-0.253 (8.55)**	-0.122 (4.62)**	-0.224 (7.87)**	-0.177 (6.36)**	-0.210 (7.40)**	-0.170 (6.15)**	-0.190 (6.85)**
$IMDEP_{i,9596}$	-0.085 (0.98)	-0.089 (1.02)	0.040 (0.45)	0.120 (1.37)	-0.063 (0.72)	0.180 (2.05)*	-0.127 (1.46)	-0.085 (0.97)	-0.580 (6.71)**	-0.204 (2.32)*	-0.520 (6.16)**
$INEXP_{j,9596}$							5.794 (14.74)**		4.494 (14.45)**	5.437 (14.20)**	4.300 (14.46)**
$RNEXP_{j,9596}$							1.472 (6.70)**		1.050 (5.11)**	1.307 (6.04)**	1.023 (5.00)**

Table 9.17 continued

Table 9.17 concluded

Dependent variable	$\Delta EXP_{i,t}$										
Specification	9.29	9.30	9.31	9.32	9.33	9.34	9.35	9.36	9.37	9.38	9.39
$IEXP_{j,9596}$								3.558 (13.39)**			
$REXP_{j,9596}$								3.239 (14.38)**			
$DRI_{j,9596}$									0.376 (5.08)**		
$DLI_{j,9596}$									0.176 (2.63)**		
$IRI_{j,95}$										4.531 (10.67)**	
$ICI1_{j,9596}$ (a)										-0.002 (7.10)**	
$ISI2_{j,9596}$										-2.158 (10.95)**	
$COMP_{j,89}$											0.476 (7.56)**
Mills ratio	8.842 (19.36)**	8.811 (19.36)**	9.116 (19.98)**	9.271 (20.12)**	8.860 (19.26)**	9.540 (19.75)**	8.839 (20.08)**	8.489 (19.36)**	8.938 (19.19)**	8.732 (20.04)**	8.913 (19.34)**
Year Dummy 1998	-11.080 (22.87)**	-11.050 (22.88)**	-11.363 (23.50)**	-11.522 (23.62)**	-11.099 (22.74)**	-11.791 (23.08)**	-11.093 (23.71)**	-10.737 (23.00)**	-11.170 (22.65)**	-10.988 (23.70)**	-11.150 (22.84)**
Year Dummy 1999	-0.281 (5.23)**	-0.280 (5.22)**	-0.289 (5.39)**	-0.294 (5.47)**	-0.282 (5.24)**	-0.300 (5.57)**	-0.280 (5.23)**	-0.271 (5.07)**	-0.284 (5.26)**	-0.277 (5.18)**	-0.283 (5.25)**
Year Dummy 2000	1.015 (16.33)**	1.013 (16.32)**	1.037 (16.70)**	1.050 (16.85)**	1.016 (16.30)**	1.071 (16.93)**	1.019 (16.61)**	0.990 (16.09)**	1.023 (16.33)**	1.011 (16.55)**	1.022 (16.39)**
Dummy variables for industries	Included	Included	Included	Included	Included	Included	Included	Included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Constant	-15.494 (20.90)**	-15.456 (20.90)**	-15.924 (21.44)**	-15.030 (21.24)**	-15.050 (20.76)**	-13.190 (20.72)**	-17.723 (21.26)**	-17.807 (20.66)**	-17.371 (20.24)**	-19.648 (20.72)**	-17.268 (20.34)**
R-squared	0.19	0.19	0.18	0.18	0.19	0.19	0.19	0.19	0.18	0.19	0.18
F-statistics	69.09	67.92	71.6	71.66	71.09	68.33	68.52	67.4	107.89	66.39	112.47

Notes: 1) Robust t statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

To be consistent with earlier estimations, the variable that represents foreign ownership in the other specifications is specified by FOR_{9596} instead of $DFOR_{9596}$ and $DFOR_{9596} * FOR_{9596}$.

The result in specification 9.29 also found a positive and statistically significant coefficient of $log(SIZE_{9596})$. The coefficient suggests the effect of firm size is large. A 10 percent increase in plant size causes export intensity in the crisis period to increase by 6.5 percentage points.

A clearer picture on the hypothesised diminishing marginal effect of size is given by the result of specification 9.34. The quadratic term is positive and statistically significant, implying the elasticity of ΔEXP with respect to $SIZE_{9596}$ decreases as size increases. However, the coefficient is very small which suggests that for all practical purposes the quadratic term can be ignored. Nevertheless, as the underlying relationship of $SIZE_{9596}$ was non-linear in this sample, the logarithm specification of $SIZE_{9596}$ as in specification 9.29 was adopted.

For the other firm level variables in specification 9.29, which are $log(AGE_{96})$ and $IMDEP_{9596}$, the results show results similar to those of the estimation of the export participation equation for the full sample. Therefore, exporting plants which were old and use large imported inputs tend to have exported less in the crisis period.

The coefficients of export spillover variables in specifications 9.35 and 9.36 are positive and statistically significant. The coefficients of $INEXP_{9596}$ and $RNEXP_{9596}$ show the effect of industry-specific export spillovers is much larger than the effect of region-specific export spillovers. This suggests that, for any exporting plant, having similarities in product is more important than being located in a region with good export-supporting facilities.

The results from the last three specifications show the importance of industry competitiveness in determining export performance during the crisis period and support the prediction of the Heckscher-Ohlin model. The coefficients of variables that represent industry factor intensity show the expected signs and are statistically very significant. Exporting plants in resource- and labour- intensive industries are suggested to have been more successful in increasing export performance during the crisis period, compared with exporters in other industries.

9.5.2.2 Discussion

While the above results have provided a picture of the determinants of the export supply response, several other points are worth discussing.

First, the strong and positive effect for exporting history (EP_{9596}) highlights the presumption that exporting is a costly and sometimes slow commercial activity to initiate. This is also confirmed by the strong and positive effect of export spillover variables ($INEXP_{9596}$, $RNEXP_{9596}$, $IEXP_{9596}$ and $REXP_{9596}$). If exporting was not costly, we should have been observed an insignificant effect for these variables.

This implication is important. The increase in competitiveness from the sharp exchange rate depreciation is likely to have been captured only by plants which had been exporting prior to the crisis. In Indonesian manufacturing, these plants are relatively small compared with the entire population of plants. This inference can perhaps explain the low switching rate from non-exporting to exporting as observed in the descriptive analysis. The inference further implies the common view that firms in crisis affected countries should have been able to redirect sales to the export market should be treated with caution. The finding suggests it is reasonable to observe a quick adjustment for firms that have had some exporting experience, but this is not necessarily so for firms that sell their entire output to the domestic market. For the latter, while the redirection is still possible, it is likely to happen with a lag.

Differences in efficiency and ability to produce export quality are also the key factors in shaping export response. This is implied by the results related to the $\log(LP_{9596})$, CI_{9596}, SI_{9596} and $log(SIZE_{9596})$ variables. They strongly support the self-selection hypothesis that firms need to have some cost advantages to be able to survive in competitive international markets. The strongest evidence supporting these factors is given by the estimation results of the export participation equation for the non-exporting sample. In this respect, non-exporting plants in industry that were able to switch to exporting in the crisis period are large, more productive, more capital intensive and use a higher share of imported inputs.

This finding also provides another reason for the low switching rate from non-exporting plants to exporting. The low switching rate might be because most non-exporting plants were either not ready or not prepared to switch. In the empirical literature on the self-selection hypothesis, it is often observed that new exporters exhibit similar characteristics to established exporters. Bernard and Jensen (1999) found that new US exporters show similar characteristics two or three years before they actually begin to export. Hallward-Driemeier et al. (2002) found many domestic-private exporters in some Asian countries closely resembled foreign exporters, which was interpreted as an indication that the focus of exports is the likely intent right from when firms are first created.

While it is reasonable to observe efficiency differences for the group of non-exporting plants, it is rather puzzling that the results indicate the differences for the group of exporting plants. From the perspective of the self-selection hypothesis, similar behaviour should not have been observed, as those joining export markets are presumed to be efficient and therefore there should not be large differences in efficiency across exporters. Nonetheless, the differences might be related to market characteristics in developing countries. As argued by Hallward-Driemeier et al. (2002), less integrated product markets – as a result of poor economic infrastructure – and, in some cases, trade protection, could allow the co-existence of productive and non-productive producers.

The last important point to consider is the strong and positive effects of foreign ownership in determining export response. This finding strongly supports the argument made by Blomstrom and Lipsey (1993) that it is easier for foreign firms to redirect sales. The results also show that the positive impact of foreign ownership is not limited to exporting plants. In particular, the probability of non-exporting plants switching during the crisis period was higher for the group of non-exporting plants with a high foreign ownership share.

This finding supports the results in Chapter 7 and 8. Therefore, it reinforces the view that foreign firms are likely to have been financially supported by their parent companies and were able to take advantage of the increase in competitiveness from the sharp exchange rate depreciation. As also noted earlier, the former reflects the observation made by several other studies (e.g. Fukao 2001; Urata, 2002). In particular, Urata observed that Japanese parent companies increased capital subscription to many foreign affiliates in crisis affected countries. For the latter, the finding highlights the strong export orientation of FDI in Asian countries and the ability of parent companies to provide market access for their affiliates. The evidence of easier sales redirection by foreign plants further implies they paid much lower costs for export expansion compared with the other plants. To a large extent, if, as is considered likely, the plants were established with an export focus, or were provided with access to foreign markets through their parent companies, this explains why their costs would have been lower.

The results from the field survey undertaken by Feridhanusetyawan et al. (2000) give an excellent example for the discussion above. They found that some private-domestic firms in the consumer and component electronics industry, which were domestically oriented, quickly entered a joint-venture agreement to gain access to export and intermediate input markets. A similar example was also found in the automotive component industry, where firms with some foreign ownership share were rescued, either in terms of financial support or market access.

This field survey also highlights the comment made earlier about the readiness of non-exporting plants. In particular, firms in the electronics industry that had established trade and production networks – irrespective of their ownership status – could easily redirect output to export markets when domestic demand was low. Thus, for these firms, access to export markets had been achieved long before the crisis, despite their domestic orientation. Furthermore, these networks tend to discipline firms, to force them to always produce to international standards. This discipline mechanism should make the process of sales redirection a lot easier. The experience of PT Great River International (GRI) – one of the largest garment producers in Indonesia – highlights this point. The fact that GRI had long been producing garments under licence from some 20 international fashion brands seems to have smoothed its sales redirection. This is reflected in a sharp increase in export earnings share from 25 per cent in 1997 to 70 per cent in 1999 (Tanudjaja 1999).

9.5.3 Did liquidity constraints affect the export supply response?

We have argued that the credit contraction to the private sector was one possible explanation for the sluggish export performance in crisis affected countries. The usual argument is that the lack of loanable funds increases this financial constraint, reduces investment and hence undermines the boost to competitiveness from the sharp exchange rate depreciation. To date, there is no clear evidence to support this theory and very a few studies address this issue. Accordingly, it is worthwhile examining the data to shed some light on the issue. In particular, this section asks whether the extent of financial constraint negatively affects the export response.

Equations 9.5 and 9.6 were re-estimated for the exporting and non-exporting sample by adding two variables representing a plant's liquidity position. The first variable is interest coverage (LEV_{9596}), which is included to proxy a plant's financial leverage. The definition of this variable was given in Chapter 7. Higher LEV_{9596} means higher financial leverage. LEV_{9596} is expected to be negatively related to the export supply response during the crisis. Higher financial leverage implies lower net worth, lower ability to obtain a loan and hence a higher likelihood of financial constraint. The second variable is the percentage change in investment financed by bank loans between the crisis and pre-crisis period ($\%\Delta LOAN\_INV$). For plant i, it is defined as

$$\%\Delta LOAN\_INV_{i,t} = \frac{(LOAN\_INV_{i,t}) - (LOAN\_INV_{t,9596})}{(LOAN\_INV_{i,9596})} \times 100$$

where $LOAN\_INV_{i,t}$ is loan investment financed by plant i in time t, $t = 1997,...,2000$ and $LOAN\_INV_{t,9596}$ is the average investment in 1995 and 1996.

$LOAN\_INV$ is included to proxy the size of the loan the plant was able to obtain. Low $LOAN\_INV$ implies a high extent of financial constraint and hence $LOAN\_INV$ is expected to be positively related to the export supply response.

Table 9.18 presents the maximum likelihood estimation results of equation 9.5 for the exporting sample. The results of the two groups of specifications were reported, each consist of three specifications that use different variables for industry factor intensity. All specifications use $INEXP_{9596}$ and $RNEXP_{9596}$ as export spillover variables. The first group includes only LEV_{9596} while the second adds $\%\Delta LOAN\_INV$.

Financial leverage does not seem to have increased the probability of exporting plants switching from the exporting state in the crisis period. The coefficients of LEV_{9596}, although showing the expected sign, were statistically insignificant across all specifications.

In contrast, a clearer picture can be obtained from the coefficients of $\%\Delta LOAN\_INV$. They are positive and statistically very significant across the specifications with this variable.

Therefore, exporting plants which were able to obtain external financing were likely to continue exporting during the crisis period. This finding supports the hypothesis that financial constraints negatively affected the export supply response.

Table 9.19, which presents the MLE results of equation 9.5 for the non-exporting sample, displays a similar picture. The only difference is that the magnitude of the negative impact of financial constraint is shown to have been higher for non-exporting plants. The coefficients of $\%\Delta LOAN\_INV$ are almost two times higher than those of the previous estimations, implying substantially higher additional credit needed by non-exporting plants if they were to enter export markets during the crisis period. Krueger and Tornell (1999) observed a similar pattern for Mexican exporters during the 1990s crisis. As they argued, the difference in the magnitude is likely because exporters are able to offer banks a more certain cash flow projection owing to their involvement in export markets.

Table 9.18 Test for liquidity constraint hypothesis: regressions results, export participation equation, exporting only

Dependent variable	$EP_{i,t}$					
Specification	9.40	9.41	9.42	9.43	9.44	9.45
$\log(LP_{i,9596})$	0.011 (0.74)	0.031 (2.06)*	0.013 (0.87)	0.010 (0.69)	0.030 (2.01)*	0.012 (0.82)
$PCI2_{i,9596}{}^{(a)}$	0.002 (0.09)	0.009 (0.30)	0.011 (0.42)	-0.025 (0.02)	-0.020 (0.23)	-0.015 (0.35)
$PSI2_{i,9596}$	0.002 (2.31)*	0.002 (2.14)*	0.002 (2.55)*	0.002 (2.27)*	0.002 (2.09)*	0.002 (2.51)*
$FOR_{i,9596}$	0.121 (2.58)**	0.121 (2.52)*	0.120 (2.56)*	0.122 (2.60)**	0.123 (2.55)*	0.121 (2.57)*
$\log(SIZE_{i,9596})$	0.092 (8.34)**	0.098 (8.51)**	0.088 (7.95)**	0.092 (8.27)**	0.098 (8.46)**	0.087 (7.88)**
$\log(AGE_{i,96})$	-0.043 (2.83)**	-0.036 (2.29)*	-0.039 (2.61)**	-0.042 (2.82)**	-0.036 (2.26)*	-0.039 (2.59)**
$IMDEP_{i,9596}$	-0.095 (1.91)+	-0.020 (0.37)	-0.077 (1.55)	-0.091 (1.83)+	-0.016 (0.29)	-0.073 (1.46)
$INEXP_{j,9596}$	0.819 (8.75)**	0.922 (5.85)**	0.778 (8.29)**	0.819 (8.74)**	0.920 (5.84)**	0.777 (8.28)**
$RNEXP_{j,9596}$	0.247 (2.07)*	0.302 (2.44)*	0.251 (2.11)*	0.248 (2.08)*	0.302 (2.43)*	0.252 (2.12)*
$DRI_{j,9596}$	0.067 (1.50)			0.068 (1.52)		
$DLI_{j,9596}$	0.048 (1.16)			0.049 (1.19)		
$IRI_{j,95}$		0.639 (2.33)*			0.645 (2.36)*	
$ICI1_{j,9596}{}^{(b)}$		-0.286 (1.92)+			-0.2.14 (1.92)+	
$ISI2_{j,9596}$		-0.299 (2.67)**			-0.300 (2.67)**	
$COMP_{j,89}$			0.106 (3.26)**			0.108 (3.30)**
$LEV_{i,9596}{}^{(b)}$	-0.011 (0.57)	-0.001 (0.69)	-0.001 (0.66)	-0.001 (0.37)	-0.001 (0.47)	-0.001 (0.45)
$\%\Delta LOAN\_INV_{i,t}$				0.027 (1.96)+	0.031 (2.18)*	0.028 (2.02)*
Year Dummy 1998	-1.413 (35.29)**	-1.419 (35.33)**	-1.415 (35.31)**	-1.418 (35.31)**	-1.424 (35.37)**	-1.419 (35.34)**
Year Dummy 1999	-0.047 (1.48)	-0.047 (1.48)	-0.047 (1.48)	-0.053 (1.68)+	-0.054 (1.70)+	-0.054 (1.68)+
Year Dummy 2000	0.135 (4.27)**	0.136 (4.30)**	0.135 (4.27)**	0.127 (3.98)**	0.127 (3.97)**	0.127 (3.97)**
Dummy variables for industries	Not included	Included	Not included	Not included	Included	Not included
Dummy variables for provinces	Included	Included	Included	Included	Included	Included
Constant	-1.226 (5.03)**	-1.558 (5.00)**	-1.225 (5.08)**	-1.222 (5.01)**	-1.556 (5.00)**	-1.221 (5.06)**
Pseudo R-squared Wald chi2	0.16 1934.5	0.16 1984.7	0.16 1945.2	0.19 661.9	0.19 713.0	0.19 673.1

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

Table 9.19 Test for liquidity constraint hypothesis: regressions results, export participation equation, non-exporting only

Dependent variable	$EP_{i,t}$					
Specification	9.46	9.47	9.48	9.49	9.50	9.51
$\log(LP_{i,9596})$	0.037 (2.50)*	0.044 (2.94)**	0.037 (2.53)*	0.037 (2.53)*	0.045 (2.96)**	0.037 (2.56)*
$PCI2_{i,9596}$	0.001 (1.84)+	0.001 (2.14)*	0.001 (2.16)*	0.001 (1.79)+	0.001 (2.08)*	0.001 (2.13)*
$PSI2_{i,9596}$ [(a)]	-0.005 (0.37)	-0.006 (0.44)	-0.002 (0.16)	-0.002 (0.40)	-0.003 (0.46)	-0.003 (0.18)
$FOR_{i,9596}$	0.318 (3.47)**	0.326 (3.52)**	0.325 (3.55)**	0.316 (3.45)**	0.323 (3.49)**	0.323 (3.53)**
$\log(SIZE_{i,9596})$	0.268 (21.27)**	0.272 (20.34)**	0.265 (21.01)**	0.268 (21.21)**	0.272 (20.30)**	0.265 (20.95)**
$\log(AGE_{i,96})$	-0.084 (5.36)**	-0.087 (5.52)**	-0.082 (5.26)**	-0.083 (5.31)**	-0.086 (5.48)**	-0.081 (5.21)**
$IMDEP_{i,9596}$	0.060 (0.96)	0.132 (2.00)*	0.056 (0.89)	0.056 (0.89)	0.129 (1.95)+	0.052 (0.82)
$INEXP_{j,9596}$	1.686 (17.44)**	1.519 (9.04)**	1.628 (16.38)**	1.685 (17.42)**	1.521 (9.06)**	1.625 (16.33)**
$RNEXP_{j,9596}$	1.301 (8.38)**	1.351 (8.49)**	1.259 (8.14)**	1.309 (8.41)**	1.360 (8.53)**	1.266 (8.17)**
$DRI_{j,9596}$	0.104 (2.57)*			0.108 (2.67)**		
$DLI_{j,9596}$	0.050 (1.27)			0.053 (1.34)		
$IRI_{j,95}$		0.039 (0.13)			0.064 (0.21)	
$ICI1_{j,9596}$ [(b)]		-0.027 (1.69)+			-0.064 (1.71)+	
$ISI2_{j,9596}$		0.127 (1.17)			0.131 (1.21)	
$COMP_{j,89}$			0.069 (2.21)*			0.072 (2.29)*
$LEV_{i,9596}$ [(b)]	-0.003 (0.73)	-0.002 (0.80)	-0.002 (0.65)	-0.005 (0.34)	-0.007 (0.41)	-0.002 (0.24)
$\%\Delta LOAN\_INV_{i,t}$				0.056 (2.43)*	0.057 (2.48)*	0.055 (2.41)*
Year Dummy 1998	-0.990 (15.55)**	-0.996 (15.60)**	-0.989 (15.59)**	-0.997 (15.63)**	-1.003 (15.69)**	-0.996 (15.68)**
Year Dummy 1999	-0.094 (2.65)**	-0.096 (2.71)**	-0.094 (2.65)**	-0.103 (2.88)**	-0.105 (2.94)**	-0.102 (2.88)**
Year Dummy 2000	0.014 (0.42)	0.013 (0.37)	0.015 (0.43)	0.003 (0.09)	0.001 (0.04)	0.004 (0.11)
Dummy variables for industries	Not included	Included	Not included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included
Constant	-3.584 (16.82)**	-3.569 (11.97)**	-3.513 (16.77)**	-3.587 (16.81)**	-3.587 (12.00)**	-3.514 (16.74)**
Pseudo R-squared	0.16	0.17	0.16	0.16	0.18	0.16
Wald chi2	1361.3	1450	1323.6	1365.7	1453.6	1326.6

Notes: 1) Robust Z statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

Table 9.20 presents the estimation results of equation 9.6 for the exporting sample, after taking into account the possible selection bias (i.e. by including the inverse Mills ratio produced by the estimations reported in Table 9.18).

The relationship regarding the relevant variables does not change in principle. LEV_{9596} and $\%\Delta LOAN\_INV$ are negatively and positively related to the adjustment in export propensity, respectively. The notable difference is that now the coefficients of LEV_{9596} are statistically significant. This finding provides stronger support for a negative impact from financial constraints on the export response.

Overall, the results suggest financial constraints negatively affected plants' export supply response during the crisis. Despite this, it does not necessarily mean the sluggish export performance during the crisis was caused by a contraction in credit. There are two reasons for this. First, the empirical analysis can not cleanly test this proposition as it only reflects the demand side of credit. Second, even if a contraction did occur, the impact is likely to have been different on exporters and non-exporters. In general, exporters tend to be favoured by banks, for the reason argued by Krueger and Tornell (1999), and hence would have been less financially constrained. The results indeed support this argument. In particular, the negative impact of financial constraints on export participation during the crisis period was higher for non-exporting plants. Access to credit is therefore another key factor for successful switching by non-exporters, in addition to being efficient and ready for competition in the international market. Exporters could also more easily find alternative sources of fund in the presence of a credit contraction. This is mainly because many of them have some share of foreign ownership. As pointed out by Blalock and Gertler (2005) and Krueger and Tornell (1999), exporters were likely to have been able to obtain trade financing from the international capital market, through the access provided by their parent companies.

Table 9.20 Test for liquidity constraint hypothesis: regressions results, export propensity adjustment equation, exporting only

Dependent variable	$\Delta EXP_{i,t}$					
Specification	9.52	9.53	9.54	9.55	9.56	9.57
$\log(LP_{i,9596})$	0.111 (4.88)**	0.231 (9.29)**	0.122 (5.35)**	0.105 (4.64)**	0.225 (9.11)**	0.116 (5.12)**
$PCI2_{i,9596}$	0.001 (1.67)+	0.001 (1.21)	0.001 (2.67)**	0.001 (1.34)	0.001 (0.85)	0.001 (2.34)*
$PSI2_{i,9596}$	0.017 (13.03)**	0.015 (11.77)**	0.018 (13.39)**	0.017 (13.00)**	0.015 (11.70)**	0.017 (13.39)**
$FOR_{i,9596}$	0.549 (6.42)**	0.558 (6.55)**	0.547 (6.43)**	0.560 (6.57)**	0.575 (6.76)**	0.557 (6.57)**
$\log(SIZE_{i,9596})$	0.604 (17.29)**	0.651 (18.46)**	0.583 (17.38)**	0.601 (17.52)**	0.648 (18.66)**	0.580 (17.60)**
$\log(AGE_{i,96})$	-0.216 (7.54)**	-0.177 (6.37)**	-0.196 (7.01)**	-0.216 (7.58)**	-0.174 (6.31)**	-0.195 (7.03)**
$IMDEP_{i,9596}$	-0.562 (6.52)**	-0.183 (2.09)*	-0.500 (5.92)**	-0.531 (6.19)**	-0.143 (1.64)	-0.465 (5.54)**
$INEXP_{j,9596}$	4.462 (14.37)**	5.370 (14.06)**	4.261 (14.35)**	4.487 (14.62)**	5.367 (14.18)**	4.278 (14.60)**
$RNEXP_{j,9596}$	1.066 (5.18)**	1.329 (6.13)**	1.041 (5.08)**	1.082 (5.26)**	1.327 (6.14)**	1.059 (5.17)**
$DRI_{j,9596}$	0.368 (4.98)**			0.378 (5.13)**		
$DLI_{j,9596}$	0.166 (2.48)*			0.178 (2.65)**		
$IRI_{j,95}$		4.546 (10.69)**			4.607 (10.87)**	
$ICI1_{j,9596}$ (a)		-0.002 (7.11)**			-0.002 (7.18)**	
$ISI2_{j,9596}$		-2.172 (11.00)**			-2.185 (11.08)**	
$COMP_{j,89}$			0.478 (7.58)**			0.495 (7.86)**
$LEV_{i,9596}$ (b)	-0.094 (3.70)**	-0.110 (4.40)**	-0.101 (3.92)**	-0.055 (2.61)**	-0.106 (3.19)**	-0.061 (2.82)**
$\%\Delta LOAN\_INV_{i,t}$				0.231 (9.74)**	0.252 (10.57)**	0.235 (9.89)**
Mills ratio	8.913 (19.12)**	8.704 (19.94)**	8.889 (19.27)**	8.966 (19.53)**	8.735 (20.28)**	8.938 (19.68)**
Year Dummy 1998	-11.143 (22.59)**	-10.958 (23.60)**	-11.124 (22.77)**	-11.236 (23.06)**	-11.032 (23.99)**	-11.215 (23.25)**
Year Dummy 1999	-0.283 (5.26)**	-0.277 (5.17)**	-0.282 (5.24)**	-0.340 (6.21)**	-0.338 (6.21)**	-0.340 (6.21)**
Year Dummy 2000	1.021 (16.28)**	1.009 (16.49)**	1.019 (16.34)**	0.955 (15.55)**	0.935 (15.59)**	0.952 (15.58)**
Dummy variables for industries	Not included	Included	Not included	Not included	Included	Not included
Dummy variable for provinces	Included	Included	Included	Included	Included	Included
Constant	-17.352 (20.18)**	-19.634 (20.64)**	-17.259 (20.28)**	-17.399 (20.55)**	-19.670 (20.94)**	-17.300 (20.64)**
R-squared	0.18	0.19	0.18	0.18	0.19	0.18
F-statistics	105.1	65.4	109.46	53.25	36.28	55.06

Notes: 1) Robust t statistics in parentheses

2) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficient was multiplied by 100 to improve presentation

b) The coefficient was multiplied by 10^5 to improve presentation

9.6 Summary

The purpose of this chapter has been to examine the export-supply response of plants in Indonesian manufacturing. It shows a picture of the response and investigates which characteristics determined the success of plants in responding to the crisis in terms of export. The empirical analysis provides some insights into the observed aggregate export performance during the crisis period and indicates the importance of plant and industry characteristics in determining the response.

The descriptive analysis shows some evidence of sales redirection. First, some plants changed status from non-exporting to exporting, albeit only a very small number relative to the total number of non-exporting plants in the industry. Second, a large number of exporting plants became more export oriented while those which had been export oriented were unlikely to have become less export oriented. Despite this evidence, the analysis shows a large variation in impact of the crisis on export performance, suggesting some exporting plants were able to exploit the increase in competitiveness while others were not.

The main findings from the econometric analysis can be summarised as follows. First, exporting history significantly determined export participation in the crisis period. Exporting before the crisis significantly increased the probability of continuing to export during the crisis. The finding emphasises the presumption that exporting is a costly economic activity to initiate. This indicates that most of the increase in competitiveness from the sharp exchange rate depreciation is likely to have been captured only by plants which had been exporting just prior to the crisis.

Second, the ability to compete in the international market – by being efficient and able to produce international-standard goods – is another key factor. The results show the effect of this factor was particularly large for non-exporting plants. This suggests the low switching rate from non-exporting to exporting observed is likely to have been because most non-exporting plants were not ready to compete in the international market. While this factor is evidently important for the group of non-exporting plants, the results also suggest it was important for the group of exporting plants.

Third, the role of foreign ownership in affecting the response is clear. It is positively related to both the change in export propensity and export participation. Foreign ownership is also suggested to have played an important role in helping non-exporting plants become exporters during the crisis.

Finally, the results show the export-supply response was negatively affected by the extent of financial constraint faced by plants. The negative relationship is observed for both exporting and non-exporting plants. Nevertheless, the results suggest the magnitude of the impact is likely to have been higher for non-exporting ones.

Appendix 9.1 Correlation matrix

	EP	EP_{96}	$\log(LP_{9596})$	$PCI2_{9596}$	$PSI2_{9596}$	$\log(SIZE_{9596})$	$\log(AGE_{96})$	$DMNC_{9596}$	$MNC_{96}*FOR_{95}$	$IMPORT_{9596}$
EP	1.00									
$EP95_{96}$	0.48	1.00								
$\log(LP_{9596})$	0.17	0.27	1.00							
$PCI2_{9596}$	0.05	0.07	0.34	1.00						
$PSI2_{9596}$	0.06	0.10	0.35	0.19	1.00					
$\log(SIZE_{9596})$	0.31	0.48	0.40	0.14	0.18	1.00				
$\log(AGE_{96})$	-0.07	-0.10	-0.03	0.02	0.00	0.07	1.00			
$DFOR_{9596}$	0.18	0.29	0.33	0.13	0.21	0.31	-0.09	1.00		
$DFOR_{96}*FOR_{9596}$	0.18	0.29	0.30	0.10	0.19	0.29	-0.10	0.93	1.00	
$IMPORT_{9596}$	0.12	0.23	0.31	0.11	0.18	0.32	-0.04	0.38	0.39	1.00
$INEXP_{9596}$	0.29	0.41	0.16	0.00	0.05	0.24	-0.17	0.13	0.14	0.08
$RNEXP_{9596}$	0.24	0.35	0.29	0.08	0.11	0.22	-0.17	0.20	0.22	0.19
$IEXP_{9596}$	0.25	0.35	0.02	-0.10	-0.04	0.18	-0.14	0.05	0.06	-0.04
$REXP_{9596}$	0.18	0.25	0.16	0.04	0.04	0.13	-0.10	0.10	0.12	0.07
IRI_{95}	0.00	-0.04	-0.12	0.04	-0.07	-0.14	0.07	-0.10	-0.10	-0.26
$ICI1_{9596}$	0.00	0.01	0.31	0.20	0.14	0.14	0.01	0.12	0.11	0.17
$ISI2_{9596}$	-0.01	-0.02	0.28	0.23	0.12	0.07	0.12	0.05	0.03	0.02
DRI_{96}	-0.04	-0.10	-0.18	0.05	-0.08	-0.15	0.11	-0.11	-0.10	-0.24
DLI_{96}	0.09	0.15	-0.02	-0.10	-0.02	0.13	-0.11	0.03	0.05	0.11
$COMP_{89}$	0.13	0.17	-0.10	-0.12	-0.09	0.13	-0.05	-0.04	-0.03	-0.10

Appendix 9.1 continued

Appendix 9.1 (concluded)

	$INEXP_{9596}$	$RNEXP_{9596}$	$IEXP_{9596}$	$REXP_{9596}$	IRI_{95}	$ICI1_{9596}$	$ISI2_{9596}$	DRI_{96}	DLI_{96}	$COMP_{89}$
$INEXP_{9596}$	1.00									
$RNEXP_{9596}$	0.28	1.00								
$IEXP_{9596}$	0.84	0.19	1.00							
$REXP_{9596}$	0.24	0.68	0.20	1.00						
IRI_{95}	-0.09	-0.10	-0.05	0.00	1.00					
$ICI1_{9596}$	0.03	0.07	-0.19	0.02	-0.17	1.00				
$ISI2_{9596}$	-0.04	0.04	-0.14	0.06	0.25	0.25	1.00			
DRI_{96}	-0.20	-0.17	-0.13	-0.05	0.85	-0.16	0.18	1.00		
DLI_{96}	0.32	0.12	0.41	0.06	-0.57	-0.21	-0.32	-0.68	1.00	
$COMP_{8996}$	0.40	0.06	0.58	0.12	0.10	-0.25	-0.16	-0.08	0.48	1.00

Chapter 10

The determinants of firm entry during the pre-crisis and crisis periods

10.1 Introduction

Chapter 6 showed that the pattern of plant entry did not seem to recover in 1999 and 2000. This raises the question as to why a contrasting pattern is observed as compared to other performance measures.

This chapter attempts to provide some answers to this question. Although it might simply reflect the lag in entry recovery, there could be some systematic forces driving the pattern. The descriptive analysis in Chapter 6 showed there was substantial variation across industries in the difference of entry rate between the crisis and pre-crisis periods. Accordingly, the main purpose of this chapter is to examine whether there are some changes in the determinants of firm entry over these periods. In addition, the differences in determinants within the period 1997-2000 are also examined. Chapter 6 also demonstrated a substantial change in the over time pattern of plant entry within this short period of time.

The rest of this chapter is organised as follows. Section 10.2 briefly reviews the literature on firm entry. Section 10.3 specifies the empirical models and spells out the hypotheses. Section 10.4 describes the measurement of variables. Section 10.5 reports and discusses the estimation results. Section 10.6 summarises and concludes.

10.2 Theoretical Background

10.2.1 Prevailing views about firm entry

There are two major approaches to the analysis of the determinants of entry. These are the limit-price model and the stochastic-replacement process.

Limit Price Model

This approach assumes entry is an equilibrating process which is attracted by, and serves to bid away, the excess profit. Entry is hypothesised to occur whenever the expected post-entry profit exceeds the level of profit in the long-run. The approach adopts the concept of a limit-price model (Bain 1949), which posits that there exists a limit price which is low enough for incumbents to be able to deter entry.

The extent to which the limit price deters entry is determined by two factors, the size of the market and the entrant's average costs curve. The latter gives rise to a cost advantage for incumbents over new entrants who may have to pay a substantial fixed entry cost. This implies the average cost curves of entrants and incumbents are not the same. According to Bain (1956), the cost advantages of incumbents over entrants are determined mainly by economies of scale, product differentiation and some absolute cost advantages.

Stochastic Replacement View

This approach considers entry is a stochastic process which does not necessarily respond to profit and may happen even if price equals marginal cost (Baldwin and Gorecki 1987). Baldwin and Gorecki argue two situations in which profit is irrelevant to the entry process. The first is related to how easily entrants can enter and capture a market share. This is captured by market demand growth. In a growing market, additional firms entering the market are unlikely to depress the market price. Hence incumbents are less threatened by entrants and are therefore less likely to act aggressively. The second is a situation where entrants simply replace some existing firms, even when long-run profits are zero.

10.2.2 Interdependence between entry and exit[1]

As in the limit price approach, entry takes place when profit is positive. Accordingly, exit should occur when profit is negative and entry-exit is expected to be negatively correlated. In

[1] A useful review of the interdependence is provided by Fotopoulus and Spence (1998).

contrast, several studies found the correlation to be positive (e.g. Dunne et al. 1988; Dunne and Roberts 1991; Austin and Rosenbaum 1991; Lay 2003). For example, Dunne and Roberts found that entry and exit are positively correlated with the price-cost margin for US manufacturing, implying that higher profit encourages both entry and exit. Lay documented that the correlation coefficient of instantaneous entry and exit for Taiwan manufacturing was positive and relatively high (about 0.5).

The literature records several explanations for the positive correlation, often termed as "interdependence". Geroski (1995) argues that entry and exit seem to be part of an evolutionary process in which a large number of new firms displace a large number of existing firms without much changing the total number of firms in an industry. This argument is similar to the 'stochastic-replacement' view of entry (Baldwin and Gorecki 1987) which posits that entry can still be expected even when industry's profitability is zero. Entry in this view simply replaces some existing firms.

Shapiro and Khemani (1987) offer two reasons for the interdependence. First, to the extent that cost heterogeneity exists, there might be some high-cost incumbents who can be displaced by low-cost entrants. Second, to the extent that barriers to entry are barriers to exit (Caves and Porter 1976; Eaton and Lipsey 1980), potential displacement is limited and incumbents are deterred from exiting. The symmetrical relationship between entry and exit barriers arises from investment with sunk cost characteristics (i.e. investment in durable and specific assets). Sunk cost creates barriers to entry because it represents a higher opportunity cost that has to be met by entrants and higher risk owing to large losses associated with unsuccessful entry. At the same time, sunk cost also creates barriers to exit because incumbents are limited by inability to divest, owing to the non-recoverable nature of the assets (Shapiro and Khemani 1987, p.16).

Shapiro and Khemani's displacement effect implies entry is responsible for exit. Fotopoulus and Spence (1998) consider the process could be the other way around. That is, exit creates room for new entry. If the two directions hold, entry and exit are causally related and the interdependence may be due to some 'displacement-replacement' effect.

10.2.3 Firm entry over the business cycle

The focus of this chapter is on entry behaviour during economic expansion and contraction. Accordingly, it is important to examine the prevailing views about entry and business cycles.

Highfield and Smiley (1987) offer two scenarios in which the business climate could lead to new business formation. The first is based on entrepreneurs making a rather naïve assumption about the current macroeconomic condition and assuming the condition will continue. It is also assumed entrepreneurs prefer favourable economic conditions to start a new business. In this scenario, new business formation is expected to increase with high economic growth, low real interest rate, a higher inflation rate, high new plant and expenditure growth and decreasing unemployment rate. This scenario is often termed the 'pull' hypothesis.

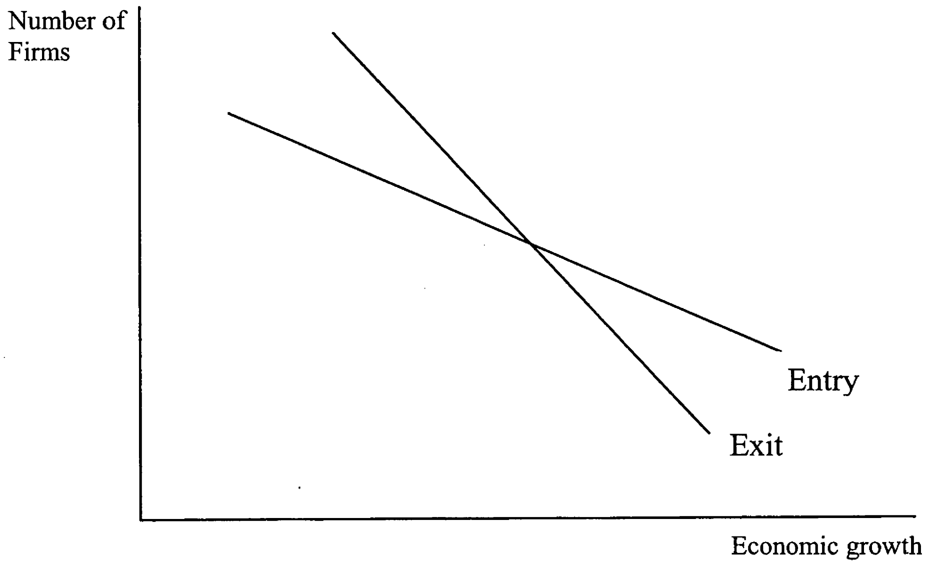
The alternative scenario is the so called 'opportunistic' scenario. In this scenario, new business is formed when there is a vacuum in current economic activity. One example provided by Highfield and Smiley (1987) relates to decreasing rates of new plant and equipment expenditure, which may provide an opportunity for newly equipped firms. In this case, the entry barrier emanating from the level of capital required is decreased. This scenario expects new business formation to be associated with low economic growth, a low inflation rate and a high real interest rate. This scenario is often termed the 'push' hypothesis. In addition to Highfield and Smiley's reasoning, others (e.g. Storey and Jones 1987; Storey 1991) have argued that a period of high unemployment 'pushes' an individual to undertake an entrepreneurial initiative owing to fear of unemployment. However, bear in mind this reasoning must be associated more with small rather than large firms (Fotopoulus and Spence 1997).

All in all, the relationship between entry and economic growth is positive under the 'pull' hypothesis and negative under the 'push' hypothesis. Relating these hypotheses to the issue of interdependence between entry and exit, there is a question as to whether the positive entry-exit correlation holds under each hypothesis.

According to Fotopoulus and Spence (1997), it is possible that the positive correlation occurs in both hypotheses. For the 'push' hypothesis, it is reasonable to assume a negative relationship between exit and economic growth. Intuitively, there is little justification for why exit should be hindered in the case of recession. This situation is depicted in Figure 10.1.

The situation is slightly different for the 'pull' hypothesis. Under a strictly 'pull' hypothesis scenario, it is hard to assume exit should be positively related to economic growth. There is no reason why large exit should be facilitated during a period of fast growth. However, Fotopoulus and Spence (1997, p.245) argue that the reasoning of a strictly 'pull' hypothesis ignores the possibility that increasing entry during favourable economic demand conditions can create a tendency towards exit. That is, there is a limit where an increasing supply of firms can not be digested by an economy, even if that economy is expanding. This scenario is termed as a 'modified pull' hypothesis, which assumes exit to be positively related to economic growth and is depicted in Figure 10.2.

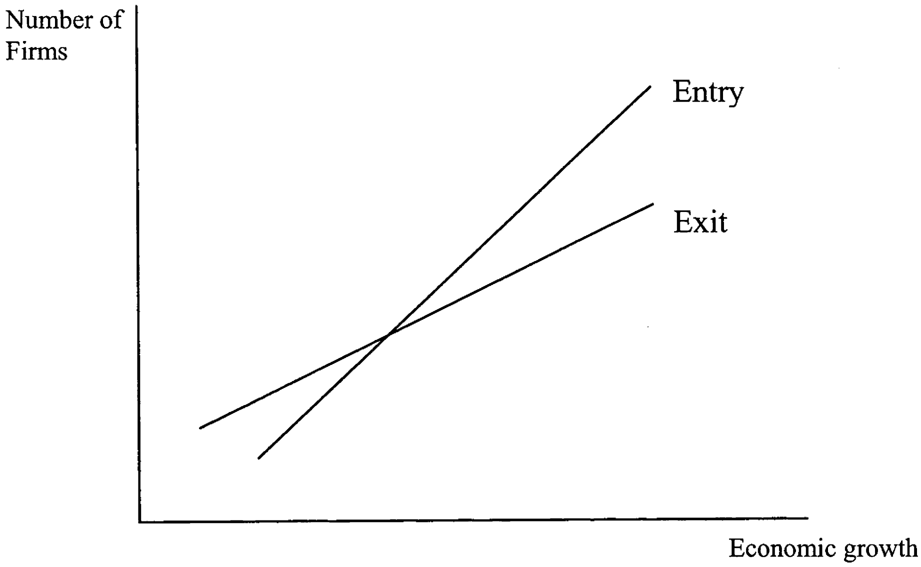
Figure 10.1 The relationship of entry and exit to economic growth: 'push' hypothesis



Source: Fotopoulus and Spence (1997)

There is not a consensus in the empirical literature on which hypothesis holds. Using a long time series data of about 40 years, Highfield and Smiley (1987) found that new business formation in the US economy tended to occur when macroeconomic conditions were not so favourable. Therefore, their study lends some support for the 'push' hypothesis. In examining the net entry of firms in Greek manufacturing, Fotopoulus and Spence (1997) found some evidence of a 'modified pull' hypothesis. Potential entrants in manufacturing industry seem to have overreacted to improved economic conditions, resulting in an over supply of new firms, which in turn sped up exits in response to the over supply.

Figure 10.2 The relationship of entry and exit to economic growth: 'modified-pull' hypothesis



Source: Fotopoulus and Spence (1997)

Some other studies have even questioned whether there should be any non-random relationship at all between firm entry behaviour and business cycles. For example, Yamawaki (1991) found the pattern of firm entry over time is very sensitive to the cyclical disturbance in Japanese manufacturing while Dunne and Roberts (1991) found the opposite for US manufacturing.

10.3 Model Specification and hypotheses

10.3.1 Model specification

This study follows the specification of entry model similar to those in the literature. An exit model is also specified for the reason that entry and exit might be causally related, as discussed in Section 10.2. Ignoring industry and time subscripts, these are

$$EN = f_1(X_1, Y_1, Z_1, REPL) \tag{10.1}$$

$$EX = f_2(X_2, Y_2, Z_2, DISP) \tag{10.2}$$

where, EN (EX) is entry (exit) rate, X_1 (X_2) is a vector of incentives for entry (exit), Y_1 (Y_2) is a vector of entry (exit) barriers, Z_1 (Z_2) is a vector of other relevant variables, $REPL$ is replacement entry and $DISP$ is displacement entry. $DISP$ and $REPL$ are included to represent displacement and replacement behaviour, respectively.

As is commonly done in the literature, $REPL$ and $DISP$ are assumed to be a function of exit and entry, respectively. Thus, equations 10.1 and 10.2 can be expressed as

$$EN = f_1(X_1, Y_1, Z_1, EX) \qquad (10.3)$$

$$EX = f_2(X_2, Y_2, Z_2, EN) \qquad (10.4)$$

Having specified displacement and replacement behaviour, the discussion now turns to the specification of other vectors. Consider, first, X_1. The specification of X_1 is derived from Orr's (1974) model, which posits that entry (E) is expected to occur whenever expected post entry profits (π^e) are above the entry-precluding level (π^*). The entry-precluding level refers to profits which would be earned by incumbents in the long-run after all entry has ceased. Orr's model is

$$E = f(\pi^e - \pi^*) \qquad (10.5)$$

Adopting the concept of a limit-price model (Bain 1949 and 1956), Orr assumes π^* depends on a vector of entry barriers (ENB) and market risk (R), that is

$$\pi^* = f(ENB, R) \qquad (10.6)$$

Substituting 10.6 into 10.5, Orr's model becomes

$$E = f(\pi^e, ENB, R) \qquad (10.7)$$

To incorporate the stochastic replacement view of entry, industry growth (GR) is added to equation 10.7.[2] So that it becomes

[2] Baldwin and Gorecki (1987) introduced market size to capture replacement entry. This chapter does not follow this approach since replacement entry has been assumed to depend on exit.

$$E = f(\pi^e, GR, ENB, R) \quad (10.8)$$

This thesis uses pre-entry profitability to proxy π^e and price-cost margin to proxy profitability (PCM_{t-1}). Market risk is proxied by the variability in industry profitability, defined as the standard deviation of PCM ($SDPCM$). Following Shapiro and Khemani (1987), GR is deflated by the minimum efficient scale (MES) to reflect a situation that there must be sufficient growth to justify additional capacity in an industry. The deflation is defined as $ROOM$ variable.

The use of pre-entry profitability as a proxy for π^e has been the usual procedure in empirical studies. However, the procedure is unlikely to proxy π^e properly. The (naïve) entrants neglect the effect their entry may have on profits because profitability between post- and pre-entry is assumed to be the same (Geroski 1991). Moreover, employing the naïve expectation may open up the possibility for incumbents to manipulate pre-entry profit and hence could discourage entry. An alternative approach is to assume entrants form rational expectations to make the entry decision. The rational expectation assumption leads to the procedure of forecasting profit based on an autoregressive model of profit. Several studies, e.g. Highfield and Smiley (1987) and Jeong and Masson (1991), provide evidence that using forecasted profits performed better than pre-entry profits. Although the alternative approach is more reasonable, it is not possible in this thesis because there are not enough time-series observations in the data base.

Two variables are included to represent barriers to entry: economies of scale (ES) and capital requirement (KR). In addition to advertising intensity, these variables represent the entry barriers considered by Bain (1956). This study did not include advertising intensity because the advertising expenditure data required to construct this variable are only available until 1996. Moreover, the data on advertising expenditure could be unreliable because they were first reported only in 1993.

Economies of scale acts as an entry barrier if industry output accounted for by minimum efficient scale (MES) constitutes a significant part of the quantity demanded at a competitive price. Potential entrants could enter on a large scale but would trigger retaliation by incumbents. Capital requirement is included to capture the extent of cost disadvantages faced by entrants. According to Bain (1956), borrowers' lack of information about potential entrants provides incumbents with an absolute cost advantage over entrants, which results in difficulties for entrants in raising investment funds.

Seller concentration is included in Y_1 to capture the strategic deterrence actions by incumbents. These are likely to occur in the post-entry period. Examples of these actions include predatory pricing, aggressive advertising campaigns and credible threats to compete hard against new rivals (Evans and Siegfried 1992). However, seller concentration may also attract entry. It facilitates collusion that in turn provides a higher survival chance given that entry has occurred. Chamberlin's (1933) model predicts that once concentration levels reach a certain point, oligopolies recognise their interdependence and that together they produce a monopoly output for the market.

The specification of vector X_2 in equation 10.4 follows earlier empirical work on the determinants of exit (e.g Deutsch 1984; MacDonald 1986; Shapiro and Khemani 1987; Flynn 1990; Doi 1999) and is similar to that of vector X_1 and Y_1 in the entry equation.

According to models of firm bankruptcy (e.g. Schary 1991), a firm decision to shut down depends on a short-term cash flow problem and assessment of long term prospects. Therefore, profitability (PCM) and industry growth (GR) are included in X2.

As noted earlier, exit barriers arise from sunk costs. The relationship between sunk costs and the probability of exit relates to the 'duration' view of sunk costs (Rosenbaum and Lamort 1992, p.299). That is, a longer production time is needed to recover sufficient returns from investment as the resale value of the non-recoverable assets can not be added to the stream of income generated by these assets. The implication is that firms with high sunk-capital costs are forced to stay in an industry longer than firms with low sunk-capital costs.

Therefore, the ideal proxies for exit barriers are those that can represent the extent of sunk costs. The strategy commonly applied in empirical studies is to create some proxies based on characteristic sunk costs, which are durability and specifity in assets. The only problem here is that it is often difficult to obtain such proxies as a result of the specifity characteristics. Despite this, Caves and Porter (1976, p.44) argue that each source of entry barrier identified by Bain can also be erected as a barrier to exit. In this argument, the durability and specifity of assets can to some extent be captured by Bain's entry barriers. For example, it is often argued that incumbents must have some resources which are at least temporarily specific to allow them to create some cost advantages over potential entrants. Otherwise, potential entrants could easily duplicate the resources and enter. Following Caves and Porter, Y_2 is specified to be identical to barriers to entry.

$CR4$ is also included in Y_2. Seller concentration facilitates collusion which could increase the probability of survival and hence may discourage exit. Despite this, low exit in highly concentrated industry may also be possible simply because firms are likely to be the established firms (Flynn 1990).

Vectors Z_1 and Z_2 are specified to include variables related to trade and international competition. The first is export orientation (EXP). The greater profit opportunities provided by the export market are likely to attract entry and hinder exit. In contrast, a higher degree of export orientation could also discourage entry and encourage exit, because it signals a greater intensity of competition in the industry. Nevertheless, the pressure for higher exit is likely to be weak since established firms must have paid substantial costs for participating in export markets.

This thesis includes import penetration (IMP) and trade protection ($TARIFF$) to represent the effect of international competition on entry. It is often argued in the literature that greater trade protection tends to facilitate non-competitive behaviour, such as collusion, and protects less efficient firms. Therefore, incumbents in a protected industry could collude and deter entry. However, entry could also be encouraged because the trade protection which allows incumbents to behave non-competitively could also be a more important incentive than the profit incentive.

Meanwhile, the effect of import competition on entry and exit is ambiguous. Higher import competition could be expected to reduce entry unless it widens the domestic market. However, it could also encourage exit as more firms increase competition and reduce the survivability of incumbents.

To sum up, the entry and exit equations can be specified as follows

$$EN = f(PCM, ROOM, SDPCM, ES, KR, CR4, EXP, IMP, TARIFF, EX) \qquad (10.9)$$

$$EX = f(PCM, GR, ES, KR, CR4, EXP, IMP, TARIFF, EN) \qquad (10.10)$$

The definition of the variables in these equations is given in Section 10.4.3.

10.3.2 Hypotheses

This section discusses how the determinants of entry would have changed over the pre-crisis and crisis periods. As in the other chapter, pre-crisis and crisis are defined as the period 1995-96 and 1997-2000, respectively. Based on the views of entry during business cycles, it can be expected that factors determining entry in Indonesian manufacturing will not be the same between these two periods. This is the general hypothesis to be tested, and can be re-stated in more detail with respect to the key determinants of entry summarised by equation 10.9.

Symmetrical relationship between entry and exit

The symmetrical relationship between entry and exit might not hold in the crisis period. For potential entrants, the opportunity cost of any new investment is likely to have been higher in this period. This is because the deep demand contraction and generally more competitive business environment should have lowered the profitability of doing business. For established firms, the role of sunk costs as exit barriers may not have been as important if firms suffered so severely from the crisis that they had gone into receivership.

Displacement and replacement entry

Displacement entry should have been more important than replacement entry in the crisis period. Due to the greater competition in this period, arguably only efficient firms were able to survive. This situation would have allowed some low-cost potential entrants to enter and successfully compete over the incumbents. This argument shares the same rationale as the 'push' hypothesis.

Demand situation

Profitability (PCM) and market growth ($ROOM$) are expected to have been more important in attracting entry during the crisis period.

Although expected to be positively related to entry, profitability and market growth may not have been so important in determining entry before the crisis. In a developing country like Indonesia, a situation that warrants a stable expected profit – instead of the expected profit itself – may have been the determining factor. It is often argued in the literature that the existence of imperfect markets, low levels of competition, and trade protection are the major source of this situation.

Based on this argument, it can be expected that profitability might have been more important in attracting entry during the crisis period. After the crisis, firms could no longer rely on a situation where a stable profit expectation was warranted.

In addition, the effect of market risk ($SDPCM$) in determining entry can be expected to have been more important in this period. The reason is that greater competitive pressure should have significantly increased the risk of doing business.

Entry barriers

The effect of economies of scale (ES) in deterring entry may not have changed between the crisis and pre-crisis periods. It is difficult to find any reason why market size and production technology, the factors that determines economies of scale, should have changed in such a short period of time.

In a similar vein, the effect of capital requirement (KR) on entry can also be expected to have been the same between the two periods. The amount of capital required to build a plant at a minimum efficient scale is likely to be industry specific and therefore unlikely to have changed. Nevertheless, a stronger negative effect might be observed for the crisis period because potential entrants could have had difficulty raising investment funds as the extent to which credit was rationed is likely to have been higher for potential entrants.

The difference in the effect of strategic entry deterrence behaviour, proxied by $CR4$, is difficult to predict a priori. Before the crisis, strategic behaviour might have been positively related to entry (i.e. it encouraged entry). Retaliatory behaviour is unlikely to occur when demand is growing, which was the situation prior to the crisis.

During and after the crisis, both positive and negative relationship can be observed. Theoretical models of oligopoly behaviour discussed in Chapter 4 (e.g. Rotemberg and Saloner 1986; Rotemberg and Woodford 1992) hypothesise that the probability of collusion is lower in a high demand situation. This hypothesis thus implies that the effect of industry concentration can be expected to have been negative during the crisis period. However, some foreign and large entrants may not have been affected by strong retaliatory behaviour, and may even have been attracted to enter because of the higher survival chance facilitated by possible collusive behaviour. Therefore, a positive relationship may also be observed.

Other determinants

Export orientation (EXP) is expected to have strongly attracted entry during and after the crisis, although its effect before the crisis is rather unclear.

The reasoning is clear. To some extent, entry in the crisis period should have been encouraged in export oriented industries. As explained in Chapter 4, the boost in competitiveness from the sharp exchange rate depreciation should have increased the expected profits from exporting.

While the effect of trade protection ($TARIFF$) in attracting entry might not have been clear before the crisis, it can be expected to have been less important during the crisis period. The extent to which incumbents engaged in non-competitive behaviour is likely to have been low in this period due to higher potential competition from imports, the latter as a result of the accelerated trade liberalisation.[3] Therefore, incentive to enter stemming from trade protection is unlikely to have been important in this period. This reasoning also suggests import competition (IMP) may have been negatively related to entry in the crisis period.

10.4 Statistical framework, data and measurement of variables

10.4.1 Statistical framework

Equations 10.9 and 10.10 form the basic equations to be estimated. Before outlining the estimating equations, it is important to discuss several relevant issues.

[3] See the description of the general impact of the crisis on the economy in Chapter 3.

First, the literature does not clearly indicate whether *EX* in the entry equation or *EN* in the exit equation should enter as current or lagged variables. Several studies, e.g. Austin and Rosenbaum (1991), Evans and Siegfried (1992) and Fotopoulus and Spence (1998), specified *EX* and *EN* as their current variables. In other words, *EX* and *EN* are assumed to be endogenous in entry and exit equations, respectively. Other studies, such as Sluewagen and Dehandschutter (1991) and Lay (2003), specified *EX* and *EN* as their lagged variables, treating them as weakly exogenous variables.[4] Because the literature is silent on which approach is more appropriate, this thesis will experiment with both.

Second, it might not be reasonable to assume the effect of profitability and growth in the entry equation is exactly mirrored in the exit equation. Following previous studies, *ROOM* is assumed to have one lag structure in the entry equation while *PCM* and *GR* are assumed to have no lags in the exit equation.[5] This approach follows Shapiro and Khemani (1987), who assume exit responds more quickly to profit and growth than entry. However, the approach does not mean the exit process is instantaneous. Shapiro and Khemani were aware that there are lags between the time when exit is considered and when it actually occurs. The assumption simply tries to capture the idea that entry is likely to be a more well-prepared action than exit.

The third issue relates to specification of entry and exit barriers. Certain types of barriers are likely to be omitted from the regression based on equations 9.9 and 9.10. For example, Geroski (1991) noted it is difficult to measure the control of incumbents over some strategic resources. Further, and as noted, specifity implied by sunk cost suggests many exit barriers are unlikely to be captured in the structural variables in the equations. To solve this problem, fixed effects – in the form of industry dummy variables – are introduced into equations 10.9 and 10.10 to capture the unobserved entry and exit barriers. This introduction is justified because entry and exit barriers tend to be constant over time, at least in the short and medium term.

This study assumes all structural variables are exogenous. To secure this assumption, lagged values are used instead of the current ones.

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[4] In one of their specifications Shapiro and Khemani (1987) include the lagged exit in the entry equation but include the current entry in the exit equation, rendering equations 9.3 and 9.4 a recursive system model.
[5] Rosenbaum and Lamort (1992) also adopt a similar approach.

Finally, as entry and exit are measured in relative terms (i.e. proportion), the dependent variables in theory and practice are bounded between zero and one. Therefore, it is reasonable to assume the sample is not drawn from normal distribution and this may lead to bias and inconsistent least square estimates. To solve this problem, logistic transformation on the dependent variables was carried out. With EN and EX (entry and exit rates) as the observed variables, the transformations are

$EN' = \ln(EN/1-EN)$ and

$EX' = \ln(EX/1-EX)$,

where EN' and EX' are the logistic transformation of EN and EX, respectively. These transformations allow the dependent variables in the regression to be drawn from a normal distribution and the estimations by a least squares approach.

While useful, this transformation approach has two limitations (Wooldridge 2002, p.662). First, it cannot be used when EN and EX take the boundary values, of either zero or one. As is commonly done in other cases, this chapter manipulated the boundary values by substituting the value zero with 0.1111 and value one with 0.9999. The data manipulation is a common approach adopted both in general empirical studies (Wooldridge, 2002) and studies on firm entry (e.g. Khemani and Shapiro 1986; Mata 1993).

The second limitation is that the parameters are difficult to interpret. According to Wooldridge and Papke (1996), further assumptions on the distribution of errors are needed to obtain the expected value of dependent variable conditional on the explanatory variables and, even with these assumptions, it is still non-trivial to obtain the expected value. Notwithstanding this limitation, this chapter proceeds with the transformation approach, because the focus here is on the change in the effect of the explanatory variables between two periods of time rather than on the magnitude of the effect.

The discussion has established two pairs of estimating entry and exit equations, specified as follows:

Model I:

$$EN'_{j,t} = \alpha_1 PCM_{j,t-1} + \alpha_2 ROOM_{j,t-1} + \alpha_3 SDPCM_{j,t-1} + \alpha_4 ES_{j,t-1} + \alpha_5 KR_{j,t-1} + \alpha_6 CR4_{j,t-1} + \alpha_7 EXP_{j,t-1} + \alpha_8 IMP_{j,t-1} + \alpha_9 TARIFF_{j,t-1} + \alpha_{10} EX_{j,t-1} + \alpha_j + \mu_{j,t} \quad (10.11)$$

$$EX'_{j,t} = \beta_1 PCM_{j,t} + \beta_2 GR_{j,t} + \beta_3 ES_{j,t-1} + \beta_4 KR_{j,t-1} + \beta_5 CR4_{j,t-1} + \beta_6 EXP_{j,t-1} + \beta_7 IMP_{j,t-1} + \beta_8 TARIFF_{j,t-1} + \beta_9 EN_{j,t-1} + \beta_j + \varepsilon_{j,t} \quad (10.12)$$

Model II:

$$EN'_{j,t} = \alpha_1 PCM_{j,t-1} + \alpha_2 ROOM_{j,t-1} + \alpha_3 SDPCM_{j,t-1} + \alpha_4 ES_{j,t-1} + \alpha_5 KR_{j,t-1} + \alpha_6 CR4_{j,t-1} + \alpha_7 EXP_{j,t-1} + \alpha_8 IMP_{j,t-1} + \alpha_9 TARIFF_{j,t-1} + \alpha_{10} EX_{j,t} + \alpha_j + \mu_{j,t} \quad (10.13)$$

$$EX'_{j,t} = \beta_1 PCM_{j,t} + \beta_2 GR_{j,t} + \beta_3 ES_{j,t-1} + \beta_4 KR_{j,t-1} + \beta_5 CR4_{j,t-1} + \beta_6 EXP_{j,t-1} + \beta_7 IMP_{j,t-1} + \beta_8 TARIFF_{j,t-1} + \beta_9 EN_{j,t} + \beta_j + \varepsilon_{j,t} \quad (10.14)$$

where,

$$t = \begin{cases} 1995, 1996 \text{ (pre-crisis period)} \\ 1997, \ldots, 2000 \text{ (crisis period)} \end{cases}$$

j = industry j

EN' = logistic transformation of the entry rate

EX' = logistic transformation of the exit rate

EN = the entry rate

EX = the exit rate

PCM = price-cost margin

$ROOM$ = industry room

GR = annual industry growth

$SDPCM$ = standard deviation of PCM

EOS = economies of scale

KR = capital requirement

$CR4$ = seller concentration

EXP = export intensity

IMP = import penetration

$TARIFF$ = trade protection

α_j, β_j = industry fixed effect of industry j

Model I and II are different in the way right-hand-side EX and EN are specified.

The equations are estimated for two periods: 1995-1996 and 1997-2000, corresponding to the pre-crisis and crisis periods, respectively. Data for each period are pooled to facilitate estimation of the model with fixed effect. The year 1994 was not included because estimating Model I for 1994 requires $EX_{j,1993}$ and $EN_{j,1993}$, and therefore data for 1992 are needed.[6] However, as described in Chapter 5, the time period for the data base does not begin until 1993.

The equations in Model I were firstly considered as independent, assuming no interdependence between entry and exit, and estimated by OLS. Next, the equations were estimated by the SURE method to account for the interdependence. The SURE method is considered because it is able to take into account the non-zero contemporaneous correlation in the error terms between the two equations. The equations in Model II were estimated by the 2SLS method. This is because $EN_{j,t}$ and $EX_{j,t}$ can be thought to be determined simultaneously.

10.4.2 Data

The sample consists of 72 manufacturing industries at the four digit level. The number of industries is smaller than the number of industries available in the data base. Oil and gas industries (ISIC 353 and 354) were dropped because they are largely monopoly state-owned companies. Some other industries were also dropped because of the difficulty in matching the ISIC code with SITC (the classification used in trade statistics) and because of the unavailability of average tariff rates. Nevertheless, the sample still represents a large variety of industries in Indonesian manufacturing.

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[6] See Section 6.4 in Chapter 6 for the formula to calculate $EN_{j,t}$ and $EX_{j,t}$.

10.4.3 Measurement of variables

Dependent variables (entry and exit rates)

The dependent variables, i.e. entry and exit rates, were discussed in Chapter 6 (Section 6.4). This chapter uses the same two alternative measures of entry which are based on the number and size of plants, where size is proxied by employment (number of employees). The entry and exit rates in terms of number of plants are labeled $EN1$ and $EX1$, respectively, while entry and exit rates in terms of employment are labeled $EN2$ and $EX2$, respectively.

Independent Variables

Some independent variables, namely price-cost margin (PCM), seller concentration ($CR4$) and import penetration (IMP), have been defined in the previous chapters. Accordingly, the definition of the independent variables presented here covers those not previously defined. All of the variables are defined for industry j, which is defined at the four digit level.

- Industry growth (GR)

GR is measured as the percentage change in real value added of industry j between t and $t-1$

$$GR = \frac{RVA_{j,t} - RVA_{j,t-1}}{RVA_{j,t-1}}$$

where VA is the value added of industry j. The industry value added is deflated by the wholesale price index (*WPI*) at the three digit ISIC level.

- Industry room ($ROOM$)

$ROOM$ is measured as GR divided by *MES*. *MES* is defined as the average plant size accounting for 50 percent of industry output (Caves et al. 1975). Plant size is measured by total number of workers.

- Standard deviation of profitability ($SDPCM$)

$SDPCM$ is measured by the standard deviation of PCM, defined at the three digit level of ISIC.

- Economies of Scale (ES)

ES is defined following (Caves et al. 1975) as a compound variable using MES and cost-disadvantages ratio (CDR), that is

$$ES = (1 - CDR) * MES$$

CDR is defined as

$$CDR = \frac{(VA/L)^{\text{smallest}}}{(VA/L)^{\text{largest}}}$$

where $(VA/L)^{\text{smallest}}$ is the value added per labour for the smallest plants accounting for 50% of industry output and $(VA/L)^{\text{largest}}$ is the value added per labour for the largest plants accounting for the largest 50% of industry output.

- Capital requirement (KR)

KR is measured following Caves et al. (1980) as

$$KR = \frac{K}{Q} * MES$$

where K/Q is the ratio of capital to labour. In the absence of reliable capital stock estimates, K/Q is proxied by the ratio of energy expenditure to production labour. This proxy follows the approach taken by Globerman et al. (1994), which was motivated by some previous studies which show that capital and energy are complementary inputs in production. Thus,

$$KR = \frac{\text{energy expenditure}}{\text{L}^{\text{prod}}} * MES$$

where L^{prod} is the number of production workers.

- Export intensity (EXP)

EXP is measured as the ratio of export to industry output.

$$EXP = \frac{\text{exports}}{\text{output}}$$

- Trade protection ($TARIFF$)

In the absence of *ERP* estimates for the period 1998-200, this chapter uses the average nominal tariff rate to proxy $TARIFF$. The data for the tariff rate are derived from the TPR series published by the WTO. For the pre-crisis period (1995-96), the tariff rates are derived from TPR 1994 (WTO 1995) and for the crisis period (1997-2000), the tariff rates are derived from TPR 1998 and 2003 (WTO 1998, 2003).

10.5 Estimation Results and Discussion

10.5.1 Estimation results

Our regressions employ the dummy variables method instead of the first differencing method for the fixed effect regression. The dummy variable method is adopted for the practical reason that data on tariff rates for the pre-crisis period do not vary over time. The *TARIFF* variable would have to be dropped from estimation if the differencing method were used. Time dummy variables are included to control for the differences that affect all sectors but change over time.

Equations in Models I and II are estimated using entry and exit rates in terms of number of plants and employment (*EN1, EX1,* $EN2$ and $EX2$). Despite this, the main analysis is based on $EN1$ and $EX1$. This approach is theoretically justified since measures of market structure, which is one of the key determinants of entry, often stress the significance of the number of firms (Baldwin 1998, p.12).

Model II was dropped from the analysis because the estimation results of model II using 2SLS method, presented in Appendix 10.1, render almost all the variables in the equations insignificant. Although this is obviously not a good result, several studies have obtained similar results (e.g. Shapiro and Khemani 1987; Austin and Rosenbaum 1991; Fotopoulus and Spence 1998).

Several industries were identified as outliers using the Hadi (1992) method. The list of these outliers is given in Appendix 10.2. This chapter controls the outliers by removing them from the sample. The usual approach of introducing dummy variables that identifies them was not adopted because it results in a perfect collinearity with the fixed industry effects (the industry dummy variables).

Tables 10.1 and 10.2 present the estimation results for Model I using OLS and SURE methods, respectively, with $EN1'$ and $EX1'$ as the dependent variable.[7] The OLS results were tested for equation misspecifications employing Ramsey's RESET test. The results in general did not indicate a specification problem, apart from the exit equation for the crisis period. The inability of the exit equation to pass the RESET test suggests the lack of explanatory power in the model. Nonetheless, it is still acceptable as industry characteristics might not be the only important variables shaping plant exit behaviour. Indeed, Chapter 8 showed some plant characteristics significantly affected the probability of plant survival during the crisis period. In the experimental stage, the residuals from the OLS estimations were examined graphically to detect heteroscedasticity. Again, apart from the exit equation in the crisis period, the examination revealed only a mild heteroscedasticity. Accordingly, the standard t-statistics were used instead of White's robust t-statistics.

The Breusch-Pagan Lagrange Multiplier (LM) statistics are employed to test whether the error terms of the entry and exit equation in Model I are contemporaneously correlated (the statistics are presented in Table 10.2). The null hypothesis of equal error terms in the entry and exit equation is rejected at the 1 and 5 per cent significance level for the pre-crisis and crisis period, respectively.[8] Therefore, it can be concluded that entry and exit in both periods were correlated. Accordingly, the results obtained by the SURE method provide the basis for the analysis (Table 10.2). The coefficients produced by the SURE method are similar to those obtained by OLS and have the same signs. However, the t-statistics improve in some estimated coefficients, which indicates the improvement in efficiency and justify the reference to the SURE results.

The estimation results of equations in Model I, without the inclusion of industry dummies, are presented in Appendix 10.3. Comparing the appendix and Table 10.2, it suggests that

[7] Three alternative specifications of entry were experimented with. The first is as in equations 10.11 or 10.13, the second is where ROOM was replaced by GR and the third is where ROOM was retained but ES was dropped. The specifications are motivated by the way ROOM is generated, which raises possible colinearity with ES. As presented in Section 10.4.2, ES is measured as ES=(1-CDR)*MES, where CDR is the cost disadvantage ratio. The experiment shows the results did not differ greatly from one specification to the other. But because the first specification performed better in terms of F-statistics, it was chosen as the basis for the analysis.

[8] The degree of freedom for the LM tests is one.

inclusion of the fixed industry effect to capture unobserved variables seems to be the correct approach. The overall significance tests (F-test) for the industry dummies of the estimations in Table 10.2 favour the inclusion of the dummies.[9] Moreover, some of the coefficient signs presented in Appendix 10.3, such as the $CR4_{t-1}$ and EXP_{t-1} variables in the entry equations, are different to the corresponding coefficients in Table 10.2. The changes in sign point to the potential bias as a result of ignoring the fixed industry effect. Similar results have been reported in other studies (e.g. Dunne and Roberts 1991; Fotopoulus and Spence 1998). For example, Dunne and Roberts found the relationship between profitability and exit to be negative before the industry fixed effects were introduced, but positive when the fixed effect was included.

Despite these supporting arguments, inclusion of the fixed effect seriously affects the significance of the estimated coefficients other than the industry dummies. With a quite large R^2, this is a rather puzzling result. The only possible explanation is that large variations in the dependent variables can in fact be explained by industry effects. In other words, much of the factors that determine entry and exit in both periods can be explained by differences which are industry specific.

This chapter employs an analysis based on the fixed effect approach (i.e. Table 10.2).[10] This approach assures a large portion of the unobserved variables are taken into account and hence were are more confident that the results are unbiased, although it does not give satisfactory results in terms of statistical significance. Adopting this approach is particularly important because large variables representing entry and exit barriers can be unobserved or industry specific (Geroski 1991).

[9] The tests are reported in Appendix 10.3.
[10] This is different for other studies (e.g. von de Fehr 1991; Fotopoulus and Spence 1998) who based the analysis on results without inclusion of fixed industry effects.

Table 10.1 The determinants of entry and exit, pre-crisis and crisis periods: regression results of Model I

	Method: OLS			
Time period	Pre-crisis	Crisis	Pre-crisis	Crisis
Dependent variable	$EN1'_{j,t}$	$EN1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$
$PCM_{j,t-1}$	-3.365 (1.32)	-0.706 (1.00)		
$SDPCM_{j,t-1}$	0.388 (1.23)	-0.014 (0.41)		
$PCM_{j,t}$			1.525 (0.37)	-0.160 (0.20)
$ROOM_{j,t-1}$	-0.699 (0.95)	0.629 (2.75)**		
$GR_{j,t}$			0.256 (0.56)	-0.138 (1.22)
$ES_{j,t-1}{}^{(b)}$	-0.011 (0.10)	-0.017 (0.23)	-0.246 (1.31)	0.070 (0.92)
$KR_{j,t-1}$	0.001 (1.38)	-0.002 (1.83)+	0.001 (1.18)	0.001 (1.01)
$CR4_{j,t-1}$	4.788 (2.46)*	2.098 (1.56)	5.531 (1.35)	0.157 (0.14)
$EXP_{j,t-1}$	1.318 (1.37)	1.116 (1.65)+	0.521 (0.27)	-1.274 (1.39)
$TARIFF_{j,t-1}$	0.064 (4.10)**	0.005 (0.23)	0.014 (0.49)	0.011 (0.47)
$IMP_{j,t-1}$	-0.027 (1.73)+	0.011 (0.70)	-0.046 (2.23)*	0.026 (1.86)+
$EN1_{j,t-1}$			3.809 (1.73)+	0.974 (0.52)
$EX1_{j,t-1}$	11.556 (1.87)+	-1.455 (0.51)		
Year dummy 1996	-0.052 (0.32)		0.522 (1.51)	
Year dummy 1998		0.303 (1.30)		-0.211 (0.79)
Year dummy 1999		-0.195 (0.49)		-2.107 (5.05)**
Year dummy 2000		-1.100 (2.94)**		-1.125 (2.73)**
F-tests	7.45**	25.14**	10.23**	5.10**
Ramsey RESET test[a] F-statistics (p-value)	0.50 (0.68)	1.33 (0.27)	1.89 (0.14)	4.20 (0.01)
R-squared	0.82	0.76	0.67	0.58

Notes: 1) Fixed industry effects are included.
2) t-statistics in parentheses.
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) F-test with the null of no ommited variables.
b) The coefficients were multiplied by 10^3 to improve presentation.

Table 10.2 The determinants of entry and exit, pre-crisis and crisis period: regression results of Model I

	Method: SURE			
Time period	Pre-crisis	Crisis	Pre-crisis	Crisis
Dependent variable	$EN1'_{j,t}$	$EN1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$
$PCM_{j,t-1}$	-3.689 (1.38)	-0.996 (1.49)		
$SDPCM_{j,t-1}$	0.437 (1.13)	-0.023 (0.29)		
$PCM_{j,t}$			2.463 (0.89)	-2.763 (1.98)*
$ROOM_{j,t-1}$	-0.496 (1.09)	0.655 (3.07)**		
$GR_{j,t}$			0.143 (0.67)	0.064 (0.67)
$ES_{j,t-1}$ [(c)]	-0.003 (0.04)	-0.016 (0.25)	-0.268 (1.54)	0.106 (1.48)
$KR_{j,t-1}$	0.001 (1.23)	-0.002 (2.68)**	0.002 (1.55)	0.001 (0.80)
$CR4_{j,t-1}$	4.714 (3.96)**	2.127 (1.57)	4.140 (1.64)	0.429 (0.37)
$EXP_{j,t-1}$	1.418 (1.48)	1.110 (2.03)*	0.669 (0.51)	-1.496 (2.40)*
$TARIFF_{j,t-1}$	0.057 (4.00)**	-0.001 (0.02)	-0.031 (1.88)+	-0.004 (0.17)
$IMP_{j,t-1}$	-0.026 (1.84)+	0.010 (0.84)	-0.033 (1.83)+	0.029 (0.73)
$EN1_{j,t-1}$			1.459 (0.97)	1.889 (1.79)+
$EX1_{j,t-1}$	9.965 (2.28)*	-0.105 (0.06)		
Year dummy 1996	-0.100 (1.04)		0.646 (3.38)**	
Year dummy 1998		0.263 (1.28)		-0.117 (0.49)
Year dummy 1999		-0.319 (0.91)		-2.195 (6.33)**
Year dummy 2000		-1.117 (3.18)**		-1.198 (3.19)**
F-statistics	18.05**	36.33**	24.60**	5.65**
Breusch-Pagan (LM) statistics (p-value)	6.67 (0.01)[a]	4.05 (0.04)[b]		
R-squared	0.82	0.76	0.67	0.58

Notes: 1) Fixed industry effects are included.
2) t-statistics in parentheses.
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) For the estimation of the entry and exit equation for the pre-crisis period.
b) For the estimation of the entry and exit equation for the crisis period.
c) The coefficients were multiplied by 10^3 to improve presentation.

The results are now examined to see whether the determinants of entry and exit in the crisis period differ to those in the pre-crisis period. The examination is divided into two parts. Firstly, the structural determinants of entry and exit, followed by examination of the determinants of interdependence between entry and exit.

10.5.1.1 The structural determinants of entry and exit

Entry

For the pre-crisis period, none of the demand incentive variables appears to explain entry. The coefficient of $ROOM_{t-1}$ is statistically insignificant and the variable sign of PCM_{t-1} does not accord with theoretical predictions. As explained, the negative effect of PCM_{t-1} might have been caused by a weakness of this variable in predicting expected profitability.[11]

$CR4_{t-1}$ is the only important entry barrier variable. However, its positive coefficient implies seller concentration induced, rather than impeded, entry. This finding supports the argument that concentrated industries provide a higher survival chance once entry has occurred. This comment is further supported by the coefficient of KR_{t-1} which also shows a positive correlation, although it is statistically insignificant.

Of the trade-related variables, $TARIFF_{t-1}$ is positively related to entry and is statistically significant. Therefore, trade protection seems to have attracted entry in this period. Meanwhile, the coefficient of IMP_{t-1} shows a negative sign but is only moderately significant (i.e. significant at the 10 per cent level). This result is consistent with an earlier finding by Anagnostaki and Louri (1995) that import penetration is negatively related to entry and exit.

The picture is completely different for the crisis period. First, demand conditions appears to explain entry, as the coefficient of $ROOM_{t-1}$ is now positive and statistically significant. Second, KR_{t-1} is negatively related to entry and its effect is statistically significant. Meanwhile, industry concentration does not now seem to explain entry, since the coefficient of $CR4_{t-1}$ is statistically insignificant, although it remains positively related to entry. Finally,

[11] See discussion in Section 10.3.1.

export orientation now seems to encourage entry, as the positive coefficient of EXP_{t-1} becomes statistically significant. In contrast, trade protection no longer seems to explain entry as the coefficient of $TARIFF_{t-1}$ has a considerably smaller t-ratio.

Exit

For the pre-crisis period, all exit-inducing variables (PCM_t and GR_t) do not seem to explain exit. The estimates of these variables have considerably smaller t-ratios. Similarly, none of the coefficients of exit barriers variables (ES_{t-1}, KR_{t-1} and $CR4_{t-1}$) is statistically significant. Only the coefficient of ES_{t-1} displays the expected sign, but its effect is only marginally supported as it is significant only at the 20 per cent level.

Of the trade-related variables, IMP_{t-1} and $TARIFF_{t-1}$ demonstrate a negative relationship with exit. However, this relationship seems only moderate since the estimated coefficients are only significant at the 10% level. This finding suggests the exit decision in this period was less encouraged by the extent of international competition. Meanwhile, industry sales orientation seems to encourage exit. The coefficient of EXP_{t-1} is positive although is not statistically significant.

The picture is again completely different for the crisis period. Demand conditions now seem to induce exit, although the evidence is only shown by PCM_t. The coefficient of PCM_t, which is about -3, suggests the effect of the decline in profitability was substantial. Finally, international competition becomes unimportant, while this is not the case for export orientation in deterring exit. In contrast to the coefficient of EXP_{t-1} that becomes negative and statistically significant, the coefficients of $TARIFF_{t-1}$ and IMP_{t-1} are no longer statistically significant for this period.

10.5.1.2 The determinants of the interdependence between entry and exit

This section seeks evidence concerning the validity of the displacement-replacement effect and the symmetry hypothesis implied by entry and exit determinants.

Pre-crisis period

The results provide some indications for the symmetry hypothesis. All entry barrier variables (ES_{t-1}, KR_{t-1} and $CR4_{t-1}$) show the same sign in both the entry and exit equations. The estimated coefficients are similar across equations, indicating a similar effect from these variables in inducing or deterring entry and exit.

It is worth noting that the process involved with the symmetry hypothesis is unlikely to be the same as the one originally hypothesised by Caves and Porter (1976). Instead of a discouraging effect, entry barriers seem to encourage both entry and exit at the same time. Two of the entry barriers variables, $CR4_{t-1}$ and KR_{t-1}, show positive sign in both the entry and exit equations.

Some support for the symmetry hypothesis is also displayed by the other variables. IMP_{t-1} appears to moderately prevent both entry and exit. As argued by Fotopoulus and Spence (1997), one reason might be that expansion in markets with high import penetration is not enough to ensure new plant creation or capacity expansion at the minimum efficient scale while, at the same time, lack of expansion in the domestic market tends to sustain collusive behaviour among incumbents. EXP_{t-1} are positively related to entry and exit. This confirms earlier findings (e.g. Anagnostaki and Louri 1995; Sleuwagen and Dehandschutter 1991) that the extent of external market encourages both entry and exit in domestic industries. While it seems to contradict a stylised fact from the micro exporting literature, which suggests exit should have been lower in exporting industries – because firms in these industries tend to be more efficient than those in other industries –, the positive relationship on exit might occur if there was a co-existence of efficient and inefficient firms in the exporting industries (Anagnostaki and Louri, 1995). According to Anagnostaki and Louri, inefficient firms are likely to be displaced by more efficient firms entering the industries, which are most likely be attracted by the profit opportunity provided by export markets.

Despite these findings, the results do not strongly validate the symmetry hypothesis. For example, $CR4_{t-1}$ is only significant in the entry equation and EXP_{t-1} is not statistically significant in either the entry or exit equations. The strongest evidence for the symmetry hypothesis is provided by IMP_{t-1}, which is statistically significant in both equations.

The results provide some indication on displacement and replacement entry. Both $EN1_{t-1}$ and $EX1_{t-1}$ in the exit and entry equation, respectively, are positive. Even so, only the replacement effect seems to explain the interdependence, since $EN1_{t-1}$ is statistically insignificant. The estimated coefficient of $EX1_{t-1}$, which is about 10, suggests a large effect of replacement under a one year adjustment structure.

Crisis period

The results provide a completely different picture to that of the pre-crisis period. There is no strong evidence for the symmetry hypothesis. Of the entry barriers variables, only $CR4_{t-1}$ shows the same sign in both entry and exit equations, albeit insignificant. The absence of evidence applies also to the other variables. In the cases where the coefficients do show the same sign in entry and exit equations, such as of IMP_{t-1} and $TARIFF_{t-1}$, they are statistically insignificant. Moreover, the symmetry hypothesis implied by export orientation in the pre-crisis period is no longer evident in this period. EXP_{t-1} is positively related to entry but negatively related to exit in the crisis period.

Displacement entry seems to have been more important. The positive coefficient of $EN1_{t-1}$ is statistically significant in the exit equation, although only at the 10 per cent level. The opposite is observed for replacement entry. The coefficient of $EX1_{t-1}$ changes to negative and moreover, is very statistically insignificant (i.e. the t-ratio is considerably small). This finding suggests that higher entries induced more exits in the crisis period, but higher exits did not necessarily attract more entries. The coefficient of $EN1_{t-1}$, which is about 2, suggests the extent of displacement entry is quite substantial.

10.5.1.3 Estimation results using the alternative entry and exit measure

In the preceding analysis, entry and exit rates are measured in terms of the number of plants. The equations in Model I are now re-estimated using entry and exit rates measured in terms of employment ($EN2'$ and $EX2'$) to provide robustness for the earlier findings. The results are presented in Table 10.3 and the equations are estimated using the SURE method, as the LM tests conclude that the error terms in the entry and exit equations are correlated. In terms of model fit, the results are generally satisfactory. In the four equations presented, the R^2s'

do not deviate much from the ones in $EN1'$ and $EX1'$ equations and the F tests are significant at the 1 per cent or better level.

Table 10.3 The determinants of entry and exit, pre-crisis and crisis period: regression results of model I with EN2' and EX2' as the dependent variable

	Method: SURE			
Time period	Pre-crisis	Crisis	Pre-crisis	Crisis
Dependent variable	$EN2'_{j,t}$	$EN2'_{j,t}$	$EX2'_{j,t}$	$EX2'_{j,t}$
$PCM_{j,t-1}$	-5.541 (1.73)+	-0.566 (0.89)		
$SDPCM_{j,t-1}$	-0.427 (0.97)	-0.035 (0.46)		
$PCM_{j,t}$			7.451 (2.77)**	-0.448 (0.70)
$ROOM_{j,t-1}$	-0.851 (1.65)	0.522 (2.56)*		
$GR_{j,t}$			0.378 (0.96)	0.091 (1.06)
$ES_{j,t-1}{}^{(c)}$	-0.020 (0.23)	-0.016 (0.26)	-0.219 (1.55)	0.078 (1.23)
$KR_{j,t-1}$	-0.249[c] (0.41)	-0.001 (2.06)*	0.001 (0.87)	0.001 (0.80)
$CR4_{j,t-1}$	7.149 (2.83)**	2.077 (0.81)	4.178 (1.29)	0.350 (0.34)
$EXP_{j,t-1}$	-0.058 (0.07)	1.119 (2.17)*	1.881 (1.50)	-0.949 (1.73)+
$TARIFF_{j,t-1}$	0.039 (2.45)*	0.007 (0.34)	-0.060 (0.52)	-0.018 (0.92)
$IMP_{j,t-1}$	-0.010 (0.70)	0.015 (1.27)	-0.042 (1.72)+	0.024 (0.80)
$EN2_{j,t-1}$			2.684 (1.53)	1.042 (0.82)
$EX2_{j,t-1}$	2.259 (1.79)+	-2.003 (1.08)		
Year dummy 1996	-0.219 (2.10)*		0.474 (2.83)**	
Year dummy 1998		0.133 (0.70)		-0.219 (1.10)
Year dummy 1999		-0.394 (1.21)		-2.310 (7.63)**
Year dummy 2000		-1.113 (3.37)**		-1.372 (4.22)**
F-statistics	15.23**	16.39**	12.63**	6.67**
Breusch-Pagan (LM) statistics (p-value)	11.32 (0.00)[a]	6.70 (0.01)[b]		
R-squared	0.80	0.78	0.69	0.62

Notes: 1) Fixed industry effects are included
2) t-statistics in parentheses
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) For the estimation of the entry and exit equation for the pre-crisis period.
b) For the estimation of the entry and exit equation for the crisis period.
c) The coefficients were multiplied by 10^3 to improve presentation.

In regard to the change in importance of structural factors explaining entry and exit, the results produce similar findings to the ones produced by the equations with $EN1'$ and $EX1'$. Nevertheless, a few differences in terms of statistical significance were observed. For the entry determinants, IMP_{t-1} becomes statistically significant for the crisis period but remains insignificant for the pre-crisis period. This supports the earlier finding that entry in the crisis period was more affected by demand conditions, because a positive relationship is not expected to occur unless there is expansion in the domestic market.

A similar picture can be observed regarding the evidence on the symmetry relationship and displacement-replacement entry. A symmetry relationship in entry and exit determinants for the pre-crisis period appears less convincing. Of the variables which indicated symmetry in the $EN1'$ and $EX1'$ equations ($CR4$, KR, IMP and EXP), only $CR4$ and IMP suggest the symmetry relationship. As for the displacement-replacement entry, the replacement effect is weakly indicated for the pre-crisis period, as shown by the positive but less statistically significant coefficient of $EX2_{t-1}$ in the entry equation. Meanwhile, the displacement entry is more apparent. The coefficient of $EN2_{t-1}$ in the exit equation has larger t-ratio and the same positive sign. For the crisis period, there is weaker evidence for displacement entry. The coefficient of $EN2_{t-1}$ in the exit equation, although still positive, has a very small t-ratio.

In summary, the earlier findings based on $EN1'$ and $EX1'$ are fairly robust. The general picture from Table 10.3 is similar to that described by the earlier results shown in Table 10.2. The main difference is that the statistical significance from the alternative results is weaker in general. There is no clear explanation for this. Perhaps it reflects a lower variation in $EN2'$ and $EX2'$. This is possible because much of the entry was usually by small firms or plants.

10.5.2 Discussion

In summary, the results show substantial differences in the factors determining entry between the crisis and pre-crisis periods and provide some support for the hypotheses. In particular, seller concentration and tariff protection, which were important in explaining entry before the crisis, were no longer important during the crisis period. Industry growth and export intensity were the important factors encouraging entry in this period. Entry in this period is also suggested to have been discouraged more by higher market risk. The picture on the exit side is to a large extent consistent. Export intensity becomes important and acts as a factor that deters exit in the crisis period. A change was also observed in the importance of displacement and replacement entry. While entry before the crisis was substantially explained by replacement entry, it was explained more by displacement entry in crisis period. Meanwhile, the symmetry implied by the entry and exit determinants seems to hold only for the pre-crisis period.

The results provide some answers to the question of why entry in Indonesian manufacturing not had begun to recover in the period 1999-2000. One possible answer is because there was an increase in the extent of cost disadvantages faced by potential entrants. This is reflected in the importance of capital requirement in deterring entry in this period. The cost disadvantage is likely to take the form of higher capital cost, most likely as a result of the collapse of the domestic financial system and more cautious banks after the crisis.

Another possible explanation is that there was a dramatic increase in the competitive environment. In other words, the competitive struggle is revealed to have been much stronger in the crisis period. This is implied by the results, which indicate much of the entry process before the crisis was driven by the non-competitive nature of industry. This is likely to be due to collusive behaviour, as reflected in the findings that industry concentration ($CR4_{t-1}$) and trade protection ($TARIFF_{t-1}$) had a large and important effect in attracting entry before the crisis.

The stronger competitive process itself is suggested by several results. First, the unimportance of industry concentration ($CR4_{t-1}$) and trade protection ($TARIFF_{t-1}$) in the crisis period suggests the likelihood that collusion was reduced substantially. Second, demand and profit opportunities became more important to induce entry. If the entry process is viewed according to Orr's (1974) model, and provided there was no large increase in expected profitability, this could have indicated some decline in the extent of entry barriers across industries. The decline implies a move to the ideal of perfect competition as entry became less restricted.

Third, the crisis seems to have pushed out some less efficient firms. This inference is supported by the importance of displacement entry in the crisis period. As argued by Shapiro and Khemani (1987), displacement entry may occur because some high-cost incumbents can be displaced by some low-cost entrants. The importance of displacement entry is consistent with the conclusion from what happened in Chile after the 1980s recession. Liu (1993) found firms in Chilean manufacturing were more efficient on average than existing firms before the recession. This supports the general hypothesis in the literature that a competitive environment is more conducive to higher efficiency.[12] All in all, the importance of displacement entry reflects a more competitive process in the crisis period.

Apart from showing the differences in entry and exit determinants, the results also indicate that the crisis seems to have provided opportunities for some potential entrants despite the unfavourable economic situation. One source of these opportunities was the lack of investment funds, which provide opportunities for entrants less dependent on, or unconnected to, the domestic financial system. Another source was exchange rate depreciation. As discussed in Chapter 4, real exchange rate depreciation improves the competitiveness of domestic firms vis-à-vis those in other countries, and increases the demand for exports. Accordingly, the sharply depreciated exchange rate depreciation in the crisis period should have significantly increased expected profitability and hence entry in export oriented industries. This argument is supported by the finding that the positive impact of sales orientation was significantly larger and more important in the crisis period compared to the pre-crisis period.

An opportunity may also have been provided by the number of exiting firms. Although the econometric results do not seem to suggest this, it does not necessarily mean no replacement entry occurred in the crisis period. Indeed, the coefficient of $EX1_{t-1}$ in the entry equation for the crisis period is positive, although not statistically significant. An example of replacement entry was reported by Aswicahyono and Hill (2004), namely that major Korean firms entered the consumer electronics industry in the two years following the crisis. These firms were reported to be taking over the market left by two former major firms in the industry (Aiwa and Sony) which were having financial difficulties during the peak of the crisis.

Given these opportunities, why was there no sign of recovery in entry? It might have been because the opportunities were absorbed by only a small number of entrants. To illustrate regarding the opportunity provided by the shortage in investment funds, foreign entrants are more likely to have taken this opportunity, since they were less connected to the domestic

[12] See for example Tybout et al. (1991) and Liu (1993) for empirical studies related to the hypothesis.

financial system. The share of foreign entry has always been small in Indonesian manufacturing, so that any entry by foreign firms is not likely to have been translated in to a higher total entry rate.

10.5.3 Do the main findings differ between the crisis peak and the early recovery?

This section focuses more on the crisis period (i.e. the period 1997-2000) and asks whether there are differences in the determinants of entry between the peak of the crisis and the early recovery period, as Chapter 6 suggests. The pattern of entry rates in 1999 or 2000, although not recovered to their pre-crisis level, was substantially lower than that in 1997 and 1998.

Model I was re-estimated for the crisis peak and early recovery period, defined in this chapter as the period 1997-98 and 1999-2000, respectively. It is noted that the peak of the crisis is defined differently to the definition in Chapter 6 and 7. This is because it was shown in Chapter 6 that the crisis immediately affected entry rates in 1997.

The estimation results by the SURE method for the peak of the crisis and the early recovery period, with $EN1'$ and $EX1'$ as the dependent variables, are presented in Table 10.4. For the purpose of the discussion, the results from Table 10.2 are re-printed in the table. The overall significance (F-tests) is statistically significant at the 1 per cent level across the equations. The null hypothesis of equal error terms between the entry and exit equations is rejected only for the early recovery period, albeit only at the 10 per cent level. Despite this, the SURE method was employed. This is to be consistent with the method used earlier and because the earlier results suggested that plant entry and exit in the industry are indeed correlated.

More detailed information can be extracted from the table. First, the importance of the demand conditions in attracting entry is clear only during the early recovery period. The coefficient of $ROOM_{t-1}$ is statistically significant only in the estimation for this period. This finding highlights the extent of greater competition after the crisis and provides support for the view that a stable profit expectation was no longer warranted.

Table 10.4 The determinants of entry and exit, crisis period: regression results of Model I

	Method: SURE					
Time period	Pre-crisis	Peak crisis	Early recovery	Pre-crisis	Peak crisis	Early recovery
Dependent variable	$EN1'_{j,t}$	$EN1'_{j,t}$	$EN1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$
$PCM_{j,t-1}$	-3.689 (1.38)	-0.132 (0.17)	-3.909 (2.50)*			
$SDPCM_{j,t-1}$	0.437 (1.13)	0.149 (0.27)	-0.003 (0.03)			
$PCM_{j,t}$				2.463 (0.89)	0.313 (0.53)	-1.520 (0.73)
$ROOM_{j,t-1}$	-0.496 (1.09)	0.208 (0.50)	1.019 (4.34)**			
$GR_{j,t}$				0.143 (0.67)	0.205 (2.39)*	0.117 (0.66)
$ES_{j,t-1}^{(d)}$	-0.003 (0.04)	0.673 (3.73)**	-0.101 (1.25)	-0.268 (1.54)	-0.639 (3.97)**	0.251 (2.53)*
$KR_{j,t-1}$	0.001 (1.23)	-0.002 (2.16)*	-0.001 (1.36)	0.002 (1.55)	-0.001 (0.22)	-0.001 (1.21)
$CR4_{j,t-1}$	4.714 (3.96)**	1.334 (1.01)	5.075 (2.81)**	4.140 (1.64)	-1.379 (1.20)	1.943 (0.84)
$EXP_{j,t-1}$	1.418 (1.48)	2.217 (2.79)**	1.518 (2.13)*	0.669 (0.51)	-0.642 (0.85)	-3.282 (3.73)**
$TARIFF_{j,t-1}$	0.057 (4.00)**	-0.042 (4.24)**	0.048 (1.13)	-0.031 (1.88)+	-0.025 (3.67)**	-0.053 (1.09)
$IMP_{j,t-1}$	-0.026 (1.84)+	-0.200 (1.54)	0.010 (0.68)	-0.033 (1.83)+	-0.240 (2.04)*	0.003 (0.19)
$EN1_{j,t-1}$				1.459 (0.97)	1.803 (1.27)	1.016 (0.33)
$EX1_{j,t-1}$	9.965 (2.28)*	-1.526 (0.68)	-3.602 (1.32)			
Year dummy 1996	-0.100 (1.04)			0.646 (3.38)**		
Year dummy 1998		0.296 (1.98)*			0.058 (0.34)	
Year dummy 2000			-0.795 (3.17)**			1.002 (4.15)**
F-statistics	18.05**	35.38**	48.48**	24.60**	6.59**	5.18**
Breusch-Pagan (LM) statistics (p-value)	6.67 (0.01)[a]	2.12 (0.15)[b]	2.91 (0.09)[c]			
R-squared	0.82	0.76	0.79	0.67	0.76	0.69

Notes: 1) Peak crisis: 1997-98
2) Early recovery: 1998-99
3) Fixed industry effects are included
4) t-statistics in parentheses
5) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) For the estimation of the entry and exit equation for the pre-crisis period.
b) For the estimation of the entry and exit equation for the peak of the crisis.
c) For the estimation of the entry and exit equation for the early recovery.
d) The coefficients were multiplied by 10^3 to improve presentation.

Second, a clearer picture can be obtained of the change in the effect of trade protection on entry. Although trade protection ($TARIFF_{t-1}$) for the early recovery period is positively related to entry, it is negatively related to entry at the peak of the crisis. Thus, overall, the effect of trade protection had changed considerably from encouraging entry before the crisis to discouraging entry during the crisis peak and then becoming significantly less important during the early stage of recovery. This finding clearly reflects the effect of greater competitive pressure during and after the crisis. Accelerated trade liberalisation and contracting demand combined to eliminate any incentive to entry created by non-competitive behaviour.

Third, the extent of cost disadvantages faced by potential entrants is indicated to have been higher during the peak of the crisis. The negative relationship between capital requirement and entry is clearly shown in the results of the crisis peak rather than the early recovery period. This finding suggests that the effect of higher capital costs in deterring entry weakened as the economy recovered. Nevertheless, the basic finding – and thus the inference – from the earlier results in respect to this variable persists. That is, the effect of capital requirement on entry changed from positive before the crisis to negative during the crisis period.

Fourth, the positive effect of industry's export orientation on entry is shown to have been higher during the peak of the crisis. The coefficient of EXP_{t-1} is both higher and statistically significant in the results for the crisis peak compared to those for the early recovery. This finding is consistent with some real exchange rate appreciation in 1999.

Table 10.5 presents the separate regression results based on $EN2'$ and $EX2'$ using the SURE method, and the results shown in Table 10.3 are reprinted in the table. Unlike the results based on $EN1'$ and $EX1'$, the use of the SURE method is now more justified. The null hypothesis of equal error terms in the entry and exit equation is rejected for both the peak of the crisis and the early recovery period, albeit only at 5 and 10 per cent levels, respectively. Meanwhile, the results give the same conclusion as previously regarding the overall significance test (F-test).

Much of the additional information gained from the previous table can also be derived from Table 10.5. Apart from this, a clearer picture can now be seen for the displacement entry in the crisis period. The coefficient of $EN2_{t-1}$ in the exit equation is positive, large and statistically significant for the peak of the crisis. Despite this, the importance of displacement entry seems to have been weaker in the early stage of recovery. Although still positive, the coefficient of $EN2_{t-1}$ in the exit equation becomes statistically unimportant as the t-ratio of the estimates is considerably smaller. Overall the finding suggests the extent to which potential entrants pushed out less efficient incumbents occurred only when the economy was severely contracting.

Table 10.5 The determinants of entry and exit, crisis period: regression results of model I with EN2' and EX2' as the dependent variable

	Method: SURE					
Time period	Pre-crisis	Peak crisis	Early recovery	Pre-crisis	Peak crisis	Early recovery
Dependent variable	$EN2'_{j,t}$	$EN2'_{j,t}$	$EN2'_{j,t}$	$EX2'_{j,t}$	$EX2'_{j,t}$	$EX2'_{j,t}$
$PCM_{j,t-1}$	-5.541 (1.73)+	-0.452 (0.63)	-1.829 (1.20)			
$SDPCM_{j,t-1}$	-0.427 (0.97)	0.067 (0.13)	-0.002 (0.02)			
$PCM_{j,t}$				7.451 (2.77)**	-0.141 (0.24)	-0.038 (0.02)
$ROOM_{j,t-1}$	-0.851 (1.65)	0.128 (0.31)	0.831 (3.55)**			
$GR_{j,t}$				0.378 (0.96)	0.261 (3.04)**	-0.040 (0.25)
$ES_{j,t-1}{}^{(d)}$	-0.020 (0.23)	0.570 (3.29)**	-0.072 (0.92)	-0.219 (1.55)	-0.548 (3.45)**	0.181 (2.21)*
$KR_{j,t-1}$	-0.249[c] (0.41)	-0.002 (2.10)*	-0.001 (0.76)	0.001 (0.87)	-0.000 (0.31)	-0.001 (0.88)
$CR4_{j,t-1}$	7.149 (2.83)**	0.614 (0.49)	6.461 (3.64)**	4.178 (1.29)	-1.188 (1.03)	0.721 (0.35)
$EXP_{j,t-1}$	-0.058 (0.07)	2.185 (2.89)**	1.579 (2.30)*	1.881 (1.50)	0.727 (1.00)	-2.305 (3.13)**
$TARIFF_{j,t-1}$	0.039 (2.45)*	-0.040 (4.23)**	0.058 (1.44)	-0.060 (0.52)	-0.027 (3.86)**	-0.089 (2.13)*
$IMP_{j,t-1}$	-0.010 (0.70)	-0.371 (3.01)**	0.022 (1.46)	-0.042 (1.72)+	-0.371 (3.15)**	0.000 (0.01)
$EN2_{j,t-1}$				2.684 (1.53)	3.053 (2.65)**	2.048 (0.49)
$EX2_{j,t-1}$	2.259 (1.79)+	0.965 (0.47)	-7.336 (2.02)*			
Year dummy 1996	-0.219 (2.10)*			0.474 (2.83)**		
Year dummy 1998		0.078 (0.58)			0.136 (0.88)	
Year dummy 2000			-0.673 (2.99)**			0.870 (4.26)**
F-statistics	15.23**	20.15**	15.06**	12.63**	5.30**	5.82**
Breusch-Pagan (LM) statistics (p-value)	11.325 (0.01)[a]	3.98 (0.05)[b]	2.69 (0.10)[c]			
R-squared	0.80	0.76	0.76	0.69	0.74	0.72

Notes: 1) Peak crisis: 1997-98
2) Early recovery: 1998-99
3) Fixed industry effects are included
4) t-statistics in parentheses
5) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) For the estimation of the entry and exit equation for the pre-crisis period.
b) For the estimation of the entry and exit equation for the peak of the crisis.
c) For the estimation of the entry and exit equation for the early recovery.
d) The coefficients were multiplied by 10^3 to improve presentation.

The results now show more evidence on the lower importance of replacement entry during the crisis period. The negative effect of $EX2_{t-1}$ is statistically significant for the early recovery estimation. This finding suggests entry would not necessarily have occurred even if there had been a large flow of plants exiting an industry.

The findings regarding displacement and replacement entry reflect a clearer picture than the process of plant entry during the period 1997-2000 leans more towards the 'push' than the 'pull' hypothesis. However, this does not necessarily mean the 'pull' hypothesis was not at work. The time period covered in this study ends at the beginning of the recovery process and it is possible the 'pull' hypothesis would have been more important in the later years of the recovery. Indeed, the finding where the demand situation became more important in the early recovery period supports this argument. The entry of some Korean firms in the electronics industry, as reported by Aswicahyono and Hill (2004), also supports the argument. From the results, and as noted earlier, plants 'pulled' to enter during the early stage of the recovery are likely to have been less connected to the domestic financial market and tended to have a strong export focus.

10.6 Summary and Conclusion

The purpose of this chapter has been to look at why firm entry in Indonesian manufacturing does not seem to have started to recover as quickly as the other performance indicators. The chapter examines whether there are differences in the factors determining entry over the period 1994-2000.

The econometric results show some substantial changes in the determinants. Seller concentration and trade protection, which are indicated to have attracted firm entry before the crisis, were no longer important during the crisis period. The effect of capital requirement changed significantly from encouraging entry before the crisis to discouraging entry during the crisis period. However, the negative effect of capital requirement is only clearly shown during the peak of the crisis rather than during the early recovery period. Entry in the crisis period was largely encouraged in export oriented industries but discouraged in capital intensive industries, and the results suggest the effect of sales orientation was economically important. Despite this, the positive effect of sales orientation weakened during the early recovery period.

Examining differences in the determinants between the crisis peak and the early recovery period reveals more information about entry behaviour during the crisis period (1997-2000). The positive effect of the demand situation was clear only in the early stage of recovery, indicating that greater competitive pressure after the crisis means that plants were no longer able to operate with stable profit expectations. A consistent finding is that the effect of trade protection changed dramatically from encouraging entry previously to discouraging entry during the peak of the crisis, and continuing to lose importance in the early stage of recovery. Meanwhile, the effect of industry export orientation in attracting entry is indicated as having been higher during the peak of the crisis.

Apart from this, changes were also observed in the factors that determine interdependence between entry and exit. The results indicate displacement was important in explaining entry during the crisis period, although its effect declined in the early recovery stage. This suggests the extent to which potential entrants pushed out less efficient incumbents occurred only when the economy was severely contracting. The results also show that replacement entry became less important during the crisis period. This suggests the large flow of exiting firms did not necessarily attract substantial entry to fill the vacant room left by those exiting firms.

The results provide two possible insights. First, the declining entry pattern might have been caused by an increase in the cost disadvantages faced by potential entrants. The econometric analysis found that the effect of capital requirement as a barrier to entry changed from positive before the crisis to negative during the crisis period. The most important cost disadvantage is likely to have been a higher capital cost, due to the collapse in the domestic financial system and more selective banks after the crisis. The other possible explanation is that there was a dramatic increase in competitive pressures. This inference is mainly driven by the results which indicate the effect of non-competitive behaviour before the crisis became significantly less important during the crisis period.

The results also suggest that the crisis provided opportunities for some foreign entrants and those which are able to compete in export markets. However, these opportunities are not likely to have translated into a higher recovery rate in the entry since the numbers of the favoured firms are usually very small relative to total potential entrants in the industry.

Appendix 10.1 The determinants of entry and exit, pre-crisis and crisis periods: regression results of the equations in Model II

	Method: 2SLS			
Time period	Pre-crisis	Crisis	Pre-crisis	Crisis
Dependent variable	$EN1'_{j,t}$	$EN1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$
$PCM_{j,t-1}$	-2.197 (0.81)	-0.465 (0.62)		
$SDPCM_{j,t-1}$	0.418 (1.48)	-0.016 (0.49)		
$PCM_{j,t}$			3.534 (0.82)	-0.769 (1.00)
$ROOM_{j,t-1}$	-0.687 (1.12)	0.533 (2.35)*		
$GR_{j,t}$			0.101 (0.24)	0.051 (0.41)
$ES_{j,t-1}{}^{(a)}$	-0.019 (0.10)	0.110 (0.09)	-0.242 (1.46)	0.122 (0.98)
$KR_{j,t-1}$	0.273[a] (0.23)	-0.001 (1.70)+	0.001 (1.30)	0.176[a] (0.22)
$CR4_{j,t-1}$	4.837 (2.17)*	2.212 (1.61)	1.782 (0.38)	1.264 (0.92)
$EXP_{j,t-1}$	0.590 (0.62)	0.840 (1.20)	0.413 (0.21)	-1.073 (1.19)
$TARIFF_{j,t-1}$	0.058 (4.12)**	0.011 (0.51)	-0.036 (1.10)	0.011 (0.42)
$IMP_{j,t-1}$	-0.010 (0.57)	0.011 (0.70)	-0.017 (1.20)	0.027 (2.11)*
$EN1_{j,t-1}$			2.419 (0.81)	-7.191 (1.78)+
$EX1_{j,t-1}$	0.213 (0.05)	-5.792 (1.96)+		
Year dummy 1996	-0.318 (1.11)		0.808 (2.23)*	
Year dummy 1998		0.210 (0.91)		-0.155 (0.66)
Year dummy 1999		-0.712 (1.46)		-2.301 (5.72)**
Year dummy 2000		-1.403 (3.35)**		-1.521 (3.65)**
F-statistics R-squared	7.47** 0.77	25.23** 0.65	10.44** 0.66	3.95** 0.58

Notes: 1) Fixed industry effects are included.

2) t-statistics in parentheses.

3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%

a) The coefficients were multiplied by 10^3 to improve presentation.

Appendix 10.2 List of outliers

Sample	Outlier	
	ISIC code	Industry
1995-96	3214	Manufacture of carpets and rugs
(Pre-crisis)	3513	Manufacture of resins, plastics and fibre
	3824	Manufacture of special industrial machinery and eqauipment
	3841	Shipbuilding and repairing
	3845	Manufacture of aircraft
	3851	Professional scientific and measuring equipment
	3852	Manufacture of photographic and optical goods
1997-2000	3112	Manufacture of dairy products
(Crisis)	3131	Manufacture of liquors
	3214	Manufacture of carpets and rugs
	3512	Manufacture of fertilizer and pesticides
	3699	Manufacture of non-metallic mineral products *n.e.c*
	3821	Manufacture of engines and turbines
	3825	Manufacture of office and computing machinery
	3841	Shipbuilding and repairing
	3845	Manufacture of aircraft
	3851	Professional scientific and measuring equipment
	3852	Manufacture of photographic and optical goods
	3903	Manufacture of sporting goods

Appendix 10.3 The determinants of entry and exit, pre-crisis and crisis period: regression results of model I, without industry fixed effects

	Method: SURE			
Time period	Pre-crisis	Crisis	Pre-crisis	Crisis
Dependent variable	$EN1'_{j,t}$	$EN1'_{j,t}$	$EX1'_{j,t}$	$EX1'_{j,t}$
$PCM_{j,t-1}$	0.389 (0.43)	-1.608 (2.35)*		
$SDPCM_{j,t-1}$	0.494 (0.90)	0.073 (0.75)		
$PCM_{j,t}$			-0.642 (0.48)	0.132 (0.19)
$ROOM_{j,t-1}$	-0.485 (1.17)	0.707 (2.91)**		
$GR_{j,t}$			-0.355 (1.98)*	0.018 (0.18)
$ES_{j,t-1}{}^{(c)}$	0.139 (2.99)**	0.057 (1.82)+	0.072 (1.00)	0.065 (2.19)*
$KR_{j,t-1}$	-0.001 (4.82)**	-0.001 (2.63)**	-0.000 (1.01)	-0.001 (2.78)**
$CR4_{j,t-1}$	-0.380 (1.01)	-2.742 (6.43)**	-1.399 (2.49)*	-2.524 (6.23)**
$EXP_{j,t-1}$	-0.239 (0.63)	1.349 (2.72)**	0.813 (1.43)	0.268 (0.54)
$TARIFF_{j,t-1}$	0.023 (3.06)**	-0.014 (2.59)**	-0.011 (1.03)	-0.009 (1.61)
$IMP_{j,t-1}$	-0.015 (0.92)	0.032 (2.09)*	-0.037 (1.41)	0.033 (2.23)*
$EN1_{j,t-1}$			2.592 (2.35)*	4.025 (3.03)**
$EX1_{j,t-1}$	7.806 (4.77)**	3.207 (1.74)+		
Year dummy 1996	-0.201 (1.20)		0.642 (2.41)*	
Year dummy 1998		0.292 (1.02)	188	0.183 (0.64)
Year dummy 1999		-0.562 (1.79)+	0.17	-1.759 (5.95)**
Year dummy 2000		-1.133 (3.74)**		-0.943 (3.14)**
F-statistics				
Ho: all coefficients equal to 0[(d)]	8.84**	12.81**	6.45**	12.80**
Ho: industry fixed effects are equal	17.04**[(a)]	13.71**[(b)]		
Breusch-Pagan (LM) statistics (p-value)	17.77 (0.00)[a]	27.74 (000)[b]		
R-squared	0.29	0.28	0.17	0.31

Notes: 1) Fixed industry effects are excluded
2) t-statistics in parentheses
3) Significance level: ** significant at 1%; * significant at 5%; + significant at 10%
a) For the estimation of the entry and exit equation for the pre-crisis period.
b) For the estimation of the entry and exit equation for the crisis period.
c) The coefficients were multiplied by 10^3 to improve presentation.
d) From the estimations of Table 10.2.

Chapter 11

Summary and Conclusion

11.1 Introduction

This study examines the responses of Indonesian manufacturing firms to the deep economic crisis of 1997/98. It utilises a rich annual data set on medium and large plants in the manufacturing industry from 1993 to 2000, covering the high-growth pre-crisis period, the peak of the crisis and the early recovery. Three aspects of the responses are the focus of this study: general performance and survival, export-supply response and firm-entry response.

11.2 Main findings

Chapter 6 derived some basic facts about how the crisis affected the Indonesian manufacturing industry and provided the basis for the empirical analysis in the next four chapters.

It showed that, after a sharply rising trend in performance before the crisis, industry contracted significantly in 1998 but immediately began to recover in 1999, as all the performance measures reached the pre-crisis (1995-96) level in 2000.

The results show a large variation across industries, both during peak of the crisis and the early recovery period. The magnitude of recovery was observed to have been dramatic in several industries. This suggests some characteristics at the industry level – namely sales orientation, factor intensity, the share of imported input and foreign ownership – might have been the determining variables.

Examining the data at plant-level indicated a large variation across plants, even within the industries which expanded during the crisis. This finding indicates the differences across industries, or their characteristics, as suggested earlier might not be the only factors explaining the variation.

This chapter also showed that the crisis severely affected exit rates. These increased to almost double the pre-crisis level during the peak of the crisis but then recovered immediately. The impact on entry rates was slightly mixed. After declining significantly in 1998, they did not seem to recover in 1999 and 2000. The results also reveal that firms in the industry were resilient to the crisis. Most of the employment contraction in 1998 and 1999 was dominated by contraction from incumbents, rather than from exited plants. The analysis suggests some industry and firm characteristics determined the diversity of the plant-level responses.

Chapters 7 and 8 investigated which firm characteristics were important in shaping the performance response.

Foreign ownership and sales orientation were significant determinants and foreign firms were revealed to have performed better than domestic-private and state-owned firms, although the results greatly depended on the level of foreign share. The results also showed that the positive effect of foreign ownership increased over the years during the period 1997-2000, suggesting the role of parent companies was most important during the early stage of recovery. This observation is consistent with the view that domestic banks were more selective in providing external financing after the crisis.

Export-oriented firms were indicated to have been able to benefit from the boost in competitiveness from the sharp exchange rate depreciation, and many plants with high export propensity expanded output. The positive effect of sales orientation appears to have been weaker in the early stage of recovery. While there are many explanations for this, the declining pattern is consistent with the exchange rate appreciation which took place in 1999 and 2000.

The positive effect of sales orientation was also found to depend on other plant characteristics and to have been higher at plants with a high foreign ownership share. This interrelationship was higher and particularly important in the early recovery period, suggesting foreign plants were not financially constrained.

There was weak evidence for the interrelationship between sales orientation and financial leverage. In particular, that having a high debt did not necessarily mitigate the positive impact from being export oriented. This is similar to Latin America's experience during the currency crisis of the 1990s.

Contraction in profitability and labour productivity was larger at plants with a high government ownership share, which is consistent with the tight state budget situation during and after the crisis. Nevertheless, the contraction in employment was lower among these plants, suggesting the government exercised its power to ensure these companies shed less labour.

Plants in capital intensive industries contracted more relative to plants in resource intensive industries. A similar conclusion can be derived based on plant-level factor intensity variables. In particular, performance contraction was higher for more capital intensive plants employing higher skilled workers. This is consistent with the labour hoarding hypothesis and other studies on labour hoarding behaviour.

The results showed the role played by product market and import competition. Plants in less concentrated industries performed better than plants in more concentrated industries, while plants in industries facing high exposure to import competition performed better than plants in industries facing low import competition.

The results showed that highly leveraged plants did not necessarily perform poorly during the crisis. The coefficients of the variable representing this characteristic were mostly statistically insignificant in the regressions. Despite this, financial leverage was found to have been negatively related to the contraction when it was interrelated with some other characteristics. The negative effect was indicated to have been lower in large, foreign and export oriented plants, although in most cases the coefficients were not statistically significant.

The econometric results found that plant survival during the period 1997-2000 was determined by size, age, foreign ownership, sales orientation, factor intensity and industry competition. Of these determinants, size, age, factor intensity and industry competition were the most important. Foreign ownership and sales orientation, although positively related to a higher chance of survival, were not particularly important since the regression estimates for the variables representing them are only moderately significant. In general, these findings are consistent with those of the determinants of the performance response. The results, however, did not indicate that the effect of the determinants changed substantially between years during the crisis period.

Chapter 9 examined the export-supply response of plants to the crisis. The analysis provides some insights into the observed aggregate export performance during the period 1997-2000 and indicates the importance of plant and industry characteristics in determining the export-supply response.

The descriptive analysis showed some evidence of sales redirection. First, some plants changed status from non-exporting to exporting, although only a very small number relative to the total number of non-exporting plants in the industry. Second, a large number of exporting plants became more export oriented and those which had been export oriented were likely to remain so. Despite this, there was a large variation in the crisis' impact on export performance, suggesting not all exporting plants were able to materialise the increase in competitiveness.

The econometric analysis showed that exporting history significantly determined export participation in the crisis period. Exporting before the crisis increased the probability of continuing to do so during the crisis. This finding emphasises the presumption that exporting is a costly economic activity to initiate, which is often time consuming, so that most of the increased competitiveness was likely to have been captured by plants already exporting.

The ability to compete in the international market – by being efficient and able to produce international-standard goods – is another key determinant, and the effect of this factor was particularly large for non-exporting plants. This helps to explain the low switching rate from non-exporting to exporting observed earlier.

Foreign ownership was found to have affected the response, as it was positively related to both the change in export propensity and export participation. Foreign ownership also played an important role in helping non-exporting plants become exporters during the crisis. The magnitude of the foreign ownership variable was higher for the group of non-exporting plants.

In addition to the above findings, the results indicated the export supply response was negatively affected by the extent of the financial constraint faced. The negative relationship was observed for both exporting and non-exporting plants, although the magnitude of the impact was likely to have been higher for non-exporting ones.

Chapter 10 examined whether there are differences in the factors determining entry over the period 1994-2000.

The econometric results show some substantial changes in the determinants. Seller concentration and trade protection, indicated to have attracted firm entry before the crisis, were no longer important during the crisis period. The effect of capital requirement changed significantly from encouraging entry before the crisis to discouraging entry during the crisis period. However, the negative effect of capital requirement is only clearly shown during the peak of the crisis rather than during the early recovery period. In the crisis period entry, was largely encouraged in export oriented industries but discouraged in high capital industries. Despite this, the positive effect of sales orientation weakened during the early recovery period.

The results revealed more information about entry behaviour during the crisis period. The positive effect of the demand situation was only clear in the early stage of recovery, indicating the greater competitive pressure after the crisis means plants were no longer able to rely on stable profit expectations. A consistent finding was that the effect of trade protection changed dramatically from encouraging entry before the crisis to discouraging entry during the peak of the crisis, and continuing to lose importance in the early stage of recovery.

Changes were also observed for the factors that determine interdependence between entry and exit. The results indicated the importance of displacement entry during the crisis period, although its effect declined in the early recovery stage. This suggests the extent to which potential entrants pushed out less efficient incumbents occurred only when the economy was contracting severely. The results also show that replacement entry became less important during the crisis period. This suggests the large number of exiters did not necessarily attract substantial entry.

The results help in understanding why plant entry does not seem to have recovered compared to the other performance indicators. First, the declining entry pattern might have been caused by an increase in the cost disadvantages faced by potential entrants. The econometric analysis found the effect of capital requirement as a barrier to entry changed from positive before the crisis to negative during the crisis period. The most important cost disadvantage was likely to have been higher capital cost, due to the collapse in the domestic financial system and more selective banks after the crisis. Another possible explanation is that there was a dramatic increase in competitive environment. This inference was mainly driven by the results which indicated the effect of non-competitive behaviour before the crisis became significantly less important during the crisis period.

The results also suggested the crisis provided opportunities for some foreign entrants and those able to compete in export markets. However, these opportunities were not likely to have translated into a higher recovery rate in entry, because the numbers of favoured firms are usually very small relative to total potential entrants.

11.3 Policy implications

The author is confident in asserting that foreign ownership and export orientation were the key factors for the success of firms in responding to the crisis. The findings from the core chapters consistently point to this conclusion.[1] Thus, trade and industrial policy before the crisis, which was not designed to anticipate such a deep economic contraction as in 1997/98, unexpectedly became important. Chapter 2 showed that the share of foreign ownership and export intensity in industry only improved several years after the trade reforms initiated in the mid 1980s.

This study is quite clear in suggesting that such policies should be maintained. More explicitly, policies for higher foreign involvement and export participation should be encouraged. These policies would even be more important in the post-crisis period, for at least three reasons. First, to ensure that industry could rapidly recover to the pre-crisis situation. To a large extent the high growth in the industry before the crisis was fuelled by export oriented industries. Second, and related to this, the policies are also important because export recovery is likely to have been more difficult after the crisis. The post-crisis period

[1] The conclusion is also supported by some case studies (e.g. Tanudjaya 1999; Feridhanusetyawan et al. 2000; Aswicahyono and Hill 2004).

coincides with a period where many low cost exporters, such as China, and Vietnam, were expanding their exports rapidly (James et al. 2003; World Bank 2004). These new competitors could lower Indonesia's export share in world markets and hence its export performance. Third, the policies are important to reduce the dependency of firms on the domestic financial sector. This is because banks are likely to be more selective in lending (Pardede 1999). The implication is that domestically-owned firms were less likely to have recovered rapidly. Because these firms make up a major part of the firm population, a low foreign participation rate could translate to slow recovery at the aggregate industry level. In this respect, a higher foreign involvement, for example through merger and acquisition, can help financially distressed firms to have access to alternative sources of funds, and hence promote more rapid recovery.

The above suggestion points to the important role played by investment policy. Any policy that discourages investment, particularly foreign investment, is certainly not to be preferred. Unfortunately, some policies in the last few years have had this effect. The labour law which substantially increases severance pay obligations (i.e. the Decree of Ministry of Manpower No. 150/2001) provides a good example. Aswicahyono and Hill (2004) report that the law has substantially increased the severance cost in Indonesia, making Indonesia's dismissal regulation one of the most costly in the world. James et al. (2003) and Aswicahyono and Maidir (2004) reported that the law could have significantly constrained the potential increase in exports from the improved competitiveness.

Discriminative policy is another sort of policy to be discouraged. This is particularly important, for example, in regard the popular view that small firms performed better than large firms during the crisis. While it might be true that some small firms were able to weather the crisis better, such as those in the furniture industry (Sandee and van Diermen, 2004), it was certainly not a general pattern. In fact, our findings tend to suggest the opposite.

Regardless of some contradicting policies in the last few years, there have been some illustrations of the importance of the policy approach suggested above. For example, Aswicahyono and Hill (2004) report that efficiency in the automotive industry has improved recently, owing in part to a significant increase in foreign investment.[2] Another illustration is provided in the context of the more recent policy to reduce the fuel subsidy at the end of

[2] The increase in investment was mostly due to a significant increase in Japanese investment in the industry in the years after the crisis (Aswicahyono and Hill 2004).

2005. Although there is substantial variation in the performance impact on firms, some casual observations show that some export oriented firms survived better, for example as was reported by the newspaper *Kompas* (*15/11/2005*) for manufacturing firms in *Medan*.

It is important to emphasize there is a more complex policy agenda than the simple framework of 'encouraging' investment policy. The business community in Indonesia often complains about the continuing erosion of the country's competitiveness from the high-cost economy situation. For example, the Employers' Association of Indonesia (*Apindo*) claims that, among other things, the industry's competitiveness after the crisis has been eroded by lack of access to raw materials and high shipping and transportation costs, as well as high labour and bureaucratic costs (*Jakarta Post, 10/11/2005*). Despite this claim, a few of the examples cited earlier indeed suggest foreign investors still consider investing in Indonesia. The interest of the investors, was most recently reflected in the $80 million investment of a leading Indian motor cycle manufacturer in the country (*Jakarta Post, 23/11/2005*). Thus, overall, the encouraging investment policy framework needs to be supplemented by a consistent policy approach towards eliminating the high cost economy.

11.4 Suggestions for further research

Although the findings have generally been satisfactory, there are several areas that require further research. These can be classified into: (1) data improvement, (2) methodology, and (3) further relevant research.

Data improvement and methodology

There are some areas in which the manufacturing survey data can be improved. First, it would be very useful if a code that allows researchers to identify multi-plants firms could be added into the data. This would give more reliable information and analysis related to the demographics of firms. The availability of firm level data is also more appropriate in view of theory, since most of the analytics on firm performance and behaviour are framed at the level of firm instead of plant. Second, some information about the reasons for entry and exit, or the types of entry and exit, could also be useful to improve analysis on firm demographics. As explained, both entry and exit can take several forms for different reasons, e.g. greenfield entry or entry by merger and acquisition. Third, some improvement in data quality is clearly essential. As demonstrated, there are quite significant errors in some of the variables. The quality improvement will significantly reduce the time-consuming data adjustment process and obviously improve the quality of the research.

Methodology

The statistical approach adopted in this study, i.e. descriptive and econometric, are useful tools for analysing firm responses to the crisis. However, as mentioned the empirical models – particularly those of Chapter 8 and 9 – are limited in capturing unobserved firm characteristics which could be important in shaping the responses, such as managerial skills or access to some specific resources. To overcome this limitation, other methodological approaches are obviously necessary to supplement the statistical findings. Case studies are useful in this context.

Further relevant research

There are at least three directions where research could be extended based on the findings in this study. First, it would be valuable to further explore the role played by foreign ownership, sales orientation and size in determining the success of firms in responding to the crisis. The research could focus on determining which mechanism helps these characteristics in creating success. It could be thought of as an extension to the analysis in Chapters 7 to 9, and an empirical investigation into the reasoning outlined and discussed in Chapter 4. For this research, a few case studies revealing the behaviour of firms would be needed. Second, it would be valuable to find out whether there were differences in the type of firms entering the industry between the pre-crisis and crisis periods. This could be thought of as an extension of Chapter 10. Finally, it would be important to examine whether the basic findings of this study are still relevant several years after the crisis, because the data in this study covers only up until the early stage of recovery and it is natural to expect some substantial change in the structure of the industry after such a deep economic contraction and a radical change in the country's political and policy settings.

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